

Special Provisions for: Orleans Village BF 0310 (7)

1. LABOR SUPPLY. Available workers for this Contract may be obtained from the Vermont Department of Employment & Training's webpage at the following address: <http://www.vtlmi.info/region.cfm> and from the VTrans Office of Civil Rights and Labor Compliance's webpage at the following address: <http://vtrans.vermont.gov/sites/aot/files/civilrights/documents/edhc/EmploymentResourceList.pdf>.
2. CONTRACT COMPLETION DATE. This Contract shall be completed on or before October 6, 2020.
3. INTERIM COMPLETION DATE. The contractor shall open the bridge the two way traffic on VT 58 from MM xxx to MM xxx in Orleans Village shall be completed on or before December 6, 2019.

Liquidated damages in the amount of 43% of the applicable Contract Daily Charge Per Day of Delay in accordance with Subsection 108.12(c) will be assessed for each working day following December 6, 2019 that the specified work is not completed. These liquidated damages are separate from, and will be imposed in addition to, liquidated damages which may be imposed for failure to complete the Contract on time.

Subsection 108.11, DETERMINATION OF EXTENSION OF CONTRACT TIME FOR COMPLETION shall not apply to the interim completion requirements listed above unless authorized by the Vermont Agency of Transportation.

4. NOTICE TO BIDDERS - WORK REQUIREMENT(S). The Contractor is hereby notified that All work required to open the new Bridge to two-way traffic including:
 - (a) Phase I Bridge abutments (excluding wingwalls) and superstructure including, sidewalk, bridge railing, approach slabs, and approach railing or temporary approach railing;
 - (b) Paving first three lifts with temporary pavement markings.
- XX. NOTICE TO BIDDERS - DAVIS-BACON. U.S. Department of Labor Davis-Bacon wage rates are applicable to this Contract. Copies of the applicable rates are included in this proposal.

In the included wage rates, the requirements of Executive Order 13658 do not apply to this Contract.

- XX. NOTICE TO BIDDERS - CONTACT WITH THE AGENCY. From the time of advertising until the actual bid opening for this Contract, all prospective Contractors, subcontractors, and suppliers shall direct all inquiries related to this project solely to the Agency's Office of Contract Administration AOT.ConstructionContractingInquiry@vermont.gov.

The deadline for submitting inquiries related to this project to the Office of Contract Administration is 4:30 p.m. Eastern Time on December 12, 2018. No exceptions will be made to this requirement.

- XX. NOTICE TO BIDDERS - ABSENCE OF THE ENGINEER. The Contractor is hereby notified that in the absence of the Engineer, the Agency's Safety Officer and the Agency's Hazardous Materials and Waste Coordinator shall each have the authority to suspend work when they determine that a serious safety or environmental violation exists on the job site. The period of time work is suspended due to a serious safety or environmental violation will not be justification for an extension of time.

- XX. NOTICE TO BIDDERS - PCMS SECURITY SYSTEM. In order to prevent unauthorized access, any Portable Changeable Message Signs used on this Project shall be tamper-resistant. The control cabinet shall be locked when not in use. Each PCMS shall also have a security system that will only allow access if a code or password is entered. The default code or password shall be changed upon deployment of the PCMS by the Contractor. If the PCMS can be remotely accessed by telephone, the call shall be terminated if the correct code or password is not entered within 60 seconds of initial contact.
- xx. NOTICE TO BIDDERS - GENDER-FREE SINGLE OCCUPANCY RESTROOMS. The Contractor shall comply with all of the requirements of Vermont Act 127 (H.333) relating to the designation and signage of single-user toilet facilities in public buildings or places of public accommodation. Any such facilities may be identified by a sign, provided that the sign marks the facility as a restroom and does not indicate any specific gender.
- XX. NOTICE TO BIDDERS - CONTAMINATED SHARPS (HYPODERMIC NEEDLES). The Contractor is hereby notified that there are an increasing number of hypodermic needles (also known as contaminated sharps) being found throughout Vermont, and there is the potential to find them along any project. In accordance with Section 107.05, Sanitary Provisions, the Contractor is required to provide a neat and sanitary working environment for each of its employees and workers at no additional cost to the Agency.

If sharps are encountered on site in an area where work is required, the Contractors can reach out to the nearest VTrans District garage. There may or may not be someone who can assist with the disposal. If the Contractor chooses to pick them up, the blood borne pathogens OSHA Standard 1910.1030 should be followed. OSHA has an e-tool for disposal of sharps on their website as well. The standard can be found at the following link:

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10051.

If the sharps are not in an area where the Contractor or workers will come into contact with them, it is best practice to avoid them altogether. The area can be marked and workers should be notified to stay out of the area.

- XX. NOTICE TO BIDDERS - ELECTRONIC DOCUMENT MANAGEMENT. The Contractor is hereby notified that the Contractor, their subcontractors, and suppliers shall create a Doc Express account and use the program for collection and management of electronic documents. Doc Express is a web based document management program which accepts electronic documents and provides security as appropriate for each submittal. All Contract required documents, such as Working Drawings as defined in subsection 105.03 of the 2011 Standard Specifications for Construction, Progress Schedules, Mix Designs, Weld Procedures, Requests for Information and Erosion Control Plans shall be submitted at the following link: <https://docexpress.com>. The entire submittal and review process shall occur within Doc Express except payroll and material acceptance requirements.

All costs associated with the use of Doc Express will be considered incidental to Item 635.11, Mobilization/Demobilization. The State will manage the Doc Express platform including Contract setup upon Contract execution.

To create an account and for more information regarding the use of Doc Express see the information at the following link:

<https://outside.vermont.gov/agency/vtrans/external/docs/construction/Contracting/DocExpressOverviewforContractors.docx>

- XX. STANDARD SPECIFICATIONS. The provisions of the 2011 STANDARD SPECIFICATIONS FOR CONSTRUCTION, as modified herein, shall apply to this Contract.

- XX. SUPPLEMENTAL SPECIFICATIONS AND CONTRACT REQUIREMENTS. The Contractor's attention is directed to the following specifications and contract requirements included in the Proposal form and effective for this Contract:
Required Contract Provisions for Federal-Aid Construction
Standard Federal EEO Specifications
Workers' Compensation; State Contracts Compliance Requirement
General Special Provisions dated August 8, 2018
Bulletin 3.5 Attachment C: Standard State Provisions for Contracts and Grants
Vermont Minimum Labor & Truck Rates
Disadvantaged Business Enterprise (DBE) Policy Contract Requirements
U.S. Department of Labor Davis-Bacon Wage Rates
U.S. Army Corps of Engineers Permit #NAE-2018-00265, dated February 28, 2018
Flood Hazard Area & River Corridor General Permit #FP-2-0014.A-2018-REG, dated February 15, 2018
Certification for Federal-Aid Contracts
Contractor's EEO Certification Form
Debarment & Non-Collusion Affidavit
- XX. NOTICE TO BIDDERS - CONTRACT INSURANCE REQUIREMENTS. The Contractor is hereby notified that in the event of a discrepancy between the stated insurance requirements of Bulletin 3.5 Attachment C: Standard State Provisions for Contracts and Grants and those of Subsection 103.04 of the Standard Specifications for Construction, the requirements of Subsection 103.04 of the Standard Specifications for Construction shall govern.
- XX. NOTICE TO BIDDERS - ADDITIONAL CONTRACT REQUIREMENT. For construction and transportation projects over \$250,000.00, a payroll process by which during every pay period the Contractor collects from the subcontractors or independent contractors a list of all workers who were on the jobsite during the pay period, the work performed by those workers on the jobsite, and a daily census of the jobsite. This information, including confirmation that Contractors, subcontractors, and independent contractors have the appropriate workers' compensation coverage for all workers at the jobsite, and similar information for the subcontractors regarding their subcontractors shall also be provided to the Department of Labor and to the Department of Banking, Insurance, Securities, and Health Care Administration, upon request, and shall be available to the public.
- XX. NOTICE TO BIDDERS - STAGING AND WASTE SITES. The Contractor is hereby notified that the Vermont Natural Resources Board has requested that VTrans contractors planning to use staging and waste sites governed by preexisting Act 250 permits to notify District Coordinators prior to using these sites. Complying with preexisting Act 250 permits at these sites is the sole responsibility of the landowner and the Contractor, not the State.
- XX. NOTICE TO BIDDERS - CARGO PREFERENCE REQUIREMENT. The contractor is hereby notified that the Contractor and Subcontractor(s) are required to follow the requirements of 46 CFR 381.7 (a)-(b). For guidance on requirements of Part 381 - Cargo Preference - U.S.Flag Vessels please go to the following web link: <https://www.fhwa.dot.gov/construction/cqit/cargo.cfm>.
- XX. NOTICE TO BIDDERS - CONTROL OF ALCOHOL AND DRUG USE. The contractor is hereby notified that the Contractor and Subcontractor(s) are required to follow the requirements of 49 CFR 219. For guidance on requirements of Part 219 - Control of Alcohol and Drug Use, please go to the following web link: <https://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=8ce69f7bb9a74836043f00afda76fd08&rqn=div5&view=text&node=49:4.1.1.1.14&idno=49>.
- XX. NOTICE TO BIDDERS - GEOTECHNICAL DATA REPORT. (as applicable) The Contractor is hereby notified of the *Geotechnical Data Report* for this project. This report is available from the Contract Administration FTP site and "Advertised Projects"

website, and is being provided during the bid solicitation period for this project for informational purposes only.

- XX. NOTICE TO BIDDERS - RE-DESIGNATION OF VTRANS OFFICIALS. The Contractor is hereby notified of the following re-designation of VTrans officials as referenced in the Contract Documents:

Where in the Contract Documents it reads:	It shall be read as and shall mean:
Director of Program Development	Chief Engineer
Assistant Director of Program Development	Deputy Chief Engineer
Roadway, Traffic, and Safety Engineer; Roadway Program Manager; Highway Safety & Design Engineer;	Highway Safety and Design Program Manager
Structures Engineer	Structures Program Manager
Chief of Local Transportation Facilities	Director of Municipal Assistance Bureau
Materials and Research Engineer	Materials Manager
Director of Operations	Director of Maintenance and Operations Bureau

- XX. NOTICE TO BIDDERS - REQUIREMENTS FOR NIGHTTIME WORK. The Contractor is hereby notified that night work will be allowed during the bridge closure period.

Night work shall be performed in accordance with the National Cooperative Highway Research Program (NCHRP) Report 476 - "Guidelines for Design and Operation of Nighttime Traffic Control for Highway Maintenance and Construction". A copy of this guideline specification may be downloaded from the following website: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_476.pdf.

Prior to beginning night work, the Contractor shall design a lighting system and present it to the Engineer for approval. The Contractor shall not perform any night work or activities within the project limits until the lighting system has been fully approved and is in place on the project.

The designed lighting system shall be mobile, shall be mounted separately from other construction equipment, shall illuminate the entire work area to daylight intensity with minimal glare, and shall be a surrounding design that minimizes shadows in the work area as much as possible.

All costs associated with the lighting system will be considered incidental to Contract item number and name.

- XX. NOTICE TO BIDDERS - NIGHTTIME WORK RESTRICTIONS. The Contractor is hereby notified that during the bridge closure period, no work shall be performed between the hours of 9:00 p.m. and 7:00 a.m. that creates a noise level exceeding 75 decibels. The decibel level shall be measured from the point of activity to the nearest occupied residence.

Construction activities expected to reach this noise threshold include pneumatic hammers, hoe-ram, and similar impact type equipment.

The Contractor shall provide the Engineer, for the duration of the nighttime work, with a sound level meter capable of measuring this noise criteria during the bridge closure period.

Sound level meters shall be Rion NL-20, CESVA SC-160, Extech 407780 or an approved equal capable of meeting IEC60651: 1979 Type 2 and IEC60804: 1985 Type 2 Standards.

The cost for providing this equipment and meeting the specified noise level criteria will not be paid for separately, but will be considered incidental to all other Contract items.

XX. NOTICE TO BIDDERS - TEMPORARY CONSTRUCTION SIGNS. All temporary construction signs shall meet the following requirements:

- (a) Where sign installations are not protected by guardrail or other approved traffic barriers, all sign stands and post installations shall meet National Cooperative Highway Research Program (NCHRP) Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH). The appropriate resource shall be determined as described in the MASH publication.
- (b) As a minimum, roll up sign material shall have ASTM D 4956 Type VI fluorescent orange retroreflective sheeting.
- (c) All post-mounted signs and solid substrate portable signs shall have ASTM D 4956 Type VII, Type VIII, or Type IX fluorescent orange retroreflective sheeting.
- (d) All retroreflective sheeting on traffic cones, barricades, and drums shall be at a minimum ASTM D 4956 Type III sheeting.
- (e) All stationary signs shall be mounted on two 3 lb/ft flanged channel posts or 2 inch square steel inserted in 2 ¼" galvanized square steel anchors. No sign posts shall extend over the top edge of sign installed on said posts.
- (f) Construction signs shall be installed so as to not interfere with nor obstruct the view of existing traffic control devices, stopping sight distance, and corner sight distance from drives and town highways.
- (g) Speed zones, if used, should be a maximum of 10 mph below existing posted speeds. Temporary speed limit certificates must be approved by the Chief Engineer.

XX. NOTICE TO BIDDERS - RETROREFLECTIVE SHEETING. All retroreflective sheeting on permanent signs (signs to remain after the project is completed) shall be at a minimum ASTM D 4956 Type III sheeting, unless otherwise shown on the Plans.

XX. NOTICE TO BIDDERS - ENVIRONMENTAL. Contract Commitments as written - found on Environmental Commitments Memo.

XX. NOTICE TO BIDDERS - UTILITIES. Utility Special Provisions as written except do not write out the entire item name and number. Instead state: 'in accordance with Contract item xxx.xx'.

XX. NOTICE TO BIDDERS - AFAD. The Contractor is hereby notified that Automated Flagger Assistance Devices (AFADs) may be used as a safety enhancement to flaggers on an hour-for-hour basis. AFADs shall meet the following requirements:

- (a) All AFAD applications shall meet the requirements of the applicable sections of the current edition of the Manual on Uniform Traffic Control Devices (MUTCD).
- (b) All AFAD applications shall be in accordance with NCHRP Report 350 or the MASH for the applicable test level and device weight. Documentation of the

crashworthiness of the device shall be submitted to the Engineer for approval prior to use on the project.

- (c) AFAD applications shall be controlled by a flagger meeting the requirements of Section 630.
- (d) Should an AFAD malfunction or otherwise not function as intended they shall be replaced by another AFAD or flagger(s) or work shall cease and the roadway shall be opened to unrestricted traffic flow immediately.
- (e) Each AFAD will be considered equivalent to one flagger and shall be measured and paid for on an hourly basis under Item 630.15 Flaggers. One hour of AFAD use shall be paid for as one hour of flagging.
- (f) Flaggers will only be measured for payment when actually performing flagging duties. Flaggers controlling AFADs but not actually flagging will not be measured for payment, but will be considered incidental to the Contract lump sum price for Item 641.10 Traffic Control, or Item 900.645 Special Provision (Traffic Control, All-Inclusive), as applicable.
- (g) The use of AFADs may be suspended at the discretion of the Engineer.

XX. NOTICE TO BIDDERS - HIGHWAY PARKING RESTRICTIONS. Only such trucks and equipment as are necessary for the construction of this project will be permitted to stop or park on the shoulders or **right-of-way** of the highway or intersecting highways. All trucks or equipment so stopped or parked shall be at least 4 feet from the edge of the through traffic lanes. Parking or stopping on the traveled portion of the roadway or ramps, or at locked gate access locations, will not be permitted unless authorized by the Engineer to meet field conditions.

Private automobiles of workers will not be permitted to stop or park on the shoulders or **right-of-way** of the highways or intersecting highways. This restriction shall include all park and ride lots and rest areas within the project limits.

Each of the Contractor's trucks or equipment used for the construction of this project and permitted to park or stop as provided above shall be equipped with flashing light signals on the front and rear and the signals shall be operating at all times when parked or stopped on the highway unless otherwise authorized by the Engineer. Equipment, materials, or vehicles must be parked or placed a minimum of 30 feet from the edge of pavement in all directions or a minimum of 10 feet behind guardrail when not being utilized.

The flashing light signals shall be visibly distinct from and physically separate from the hazard warning system required by Federal and State motor vehicle laws and regulations. At least one of these flashing light signals shall be visible to traffic approaching from any angle at all times.

Qualified traffic control personnel shall be employed whenever the Contractor's vehicles or equipment (including that which belongs to the individual workers) enter or leave the traffic flow. All movement, in or out of the traffic flow, shall be with the flow of traffic.

XX. NOTICE TO BIDDERS - SPECIAL CONSTRUCTION REQUIREMENTS.

- (a) Unless otherwise permitted in writing by the Engineer, the Contractor shall not work during the holiday periods Memorial Day, July Fourth, Labor Day, Columbus Day, Veterans Day, and Thanksgiving Day. The Engineer shall give a written order designating the time of observance of these holidays and of any additional holidays required by the season, anticipated traffic, and local custom. As specified in Subsection 105.14, construction

operations shall not be performed on any Sunday without the specific authorization of the Engineer.

Designated holiday periods shall begin at 12:00 noon on the day before the weekend or holiday, whichever applies, and shall end at 7:00 a.m. on the day after the holiday or the weekend, as appropriate.

- (b) The Contractor shall maintain a safe access to all ramps and U-turns at all times during the construction of this project.
- (c) During construction it will be necessary for the Contractor to maintain one-lane traffic for extended periods of time. In no case shall the paved width for this one-lane traffic, including shoulders, be reduced to less than 11 feet. This paved width shall remain free of obstructions and obstacles at all times.
- (d) All paving operations shall be conducted such that, to the extent possible, all travel lanes are covered full width in a single paver pass. Longitudinal construction joints within any travel lane will not be permitted. Screed extension to cover adjacent shoulders concurrent with any travel lane will be permitted considering the requirement for auger extensions.
- (e) The Contractor shall position Portable Changeable Message Signs at locations determined by the Engineer properly warning motorists of the roadway conditions ahead. As directed by the Engineer, these locations may change during construction as needs arise based on daily work activities. The message to be displayed shall be submitted to the Engineer in advance for approval. The displayed message should accurately reflect what motorists can expect to encounter through the project area. The cost of providing the Portable Changeable Message Signs shall be paid for under Contract item 641.15. The Contractor shall also install and maintain appropriate construction signing warning the traveling public of the expected roadway surface conditions.
- (f) Unless otherwise directed by the Engineer, the Contractor shall begin and end the wearing course of pavement for the project with a full depth butt joint constructed as directed by the Engineer. The costs of cutting the butt joint will not be paid for directly, but will be considered incidental to the Contract wearing course item.
- (g) Grass growing adjacent to pavement or through cracks in the pavement which may hamper the placement of new bituminous concrete shall be removed by the Contractor as directed by the Engineer. Payment for this work will not be made directly, but will be considered incidental to the Contract wearing course item.
- (h) Where possible, a 2 inch space should be maintained between all final pavement markings and parallel joints in bituminous concrete pavement. The Contractor shall conduct paving operations such that the paving joint between the travel lane and adjacent shoulder will be outside of the white long line pavement markings.
- (i) Prior to final acceptance of the project, all drop inlets and bridge joints within the project limits shall be cleaned and all material within the drop inlets and bridge joints shall be removed. All paved areas adjacent to curbs shall be swept and cleaned of all extraneous material. Costs for this work will not be paid for directly, but will be considered incidental to all Contract items.
- (j) Two-way radios shall be provided by the Contractor when requested by the Engineer for use by traffic control personnel. All costs for furnishing

and using two-way radios will not be paid for directly, but will be considered incidental to Contract item **641.10, Traffic Control.**

- (k) The Contractor shall have available on the project the current editions of the Manual on Uniform Traffic Control Devices (MUTCD) and the Standard Highway Signs and Markings (SHSM) book.

Information for obtaining these publications may be found at: <http://mutcd.fhwa.dot.gov/index.htm>.

- (l) For this project, the Contractor shall have on hand on the project at all times all necessary materials, equipment, and labor to place any and all necessary interim pavement markings, including temporary line striping targets, required by the Plans or as directed by the Engineer. The markings shall be paid for under the appropriate Contract items.

The costs of maintaining marking capability at all times will not be paid for directly, but will be considered incidental to the pavement marking items in the Contract.

- (m) The Contractor shall be allowed to close VT 58 to traffic for up to twenty eight (28) days over the duration of the project. Closure durations shall be a minimum of seven (7) consecutive days and a maximum of the total closure duration of twenty eight (28) consecutive days. During a closure period access to businesses and any driveways within the project limits shall be maintained. The Contractor shall notify the Engineer of a closure fourteen (14) days prior to the anticipated closure date.

SECTION 406 - MARSHALL BITUMINOUS CONCRETE PAVEMENT
AND
SECTION 490 - SUPERPAVE BITUMINOUS CONCRETE PAVEMENT

- XX. SUBSECTIONS 406.04 and 490.04, WEATHER AND SEASONAL LIMITATIONS, have been deleted in their entirety and replaced with the following:

Bituminous material shall not be placed when the ambient air temperature and existing surface temperature at the paving site in the shade and away from artificial heat is below 40°F for courses 1-1/4 inches or greater in compacted thickness or below 50°F for courses less than 1-1/4 inches in compacted thickness. The minimum delivery, placement and compaction temperatures must be reviewed to accommodate the reduced temperature of Warm Mix Asphalt (WMA). The minimum ambient air and existing surface temperature limitations may be lowered to 35°F for WMA.

Bituminous material shall not be placed on a wet or frozen surface or when weather or other conditions would prevent the proper handling, finishing, or compacting of the material, unless otherwise approved by the Engineer. Paving, including placement of temporary pavements, shall be divided into two seasons, "In-Season" and "Extended-Season". In-Season paving occurs from May 1 - November 1, and Extended Season paving occurs from November 2 - April 30. In-Season wearing course material placement is defined as between the dates of May 15 and October 15. All other wearing course placement dates shall be defined as out of season. The following requirements shall apply unless otherwise authorized or directed by the Engineer.

Should paving operations be scheduled during the Extended Season, the Contractor must submit an Extended Season Paving Plan for the project that addresses minimum delivered mix temperature considering WMA, PMA or other additives, maximum paver speed, enhanced rolling patterns and the method to balance mixture delivery and placement operations. Paving during Extended Season shall not commence until the Engineer has approved the plan.

When it is in the public interest, the Construction Engineer may adjust the ambient air temperature requirements, pavement temperature requirements, or extend the dates of the paving season.

SECTION 406 - ASPHALT PRICE ADJUSTMENT (as required)

- XX. SUPPLEMENTAL SPECIFICATION - ASPHALT PRICE ADJUSTMENT, dated April 6, 2010, is hereby made a new Subsection of the Specifications, superseding all previous editions and their modifications.
- XX. SUPPLEMENTAL SPECIFICATION - ASPHALT PRICE ADJUSTMENT, dated April 6, 2010, GENERAL REQUIREMENTS AND CONDITIONS, part (b) text, is hereby modified by being deleted in its entirety and replaced with text "NOT USED".

The index price for asphalt cement is \$599.00 per ton.

In addition to materials produced under Contract pay item(s) as allowed in GENERAL REQUIREMENTS AND CONDITIONS, part (a) of the Supplemental Specification, asphalt cement and emulsified asphalt produced under Contract items 900.680 Special Provision (Bituminous Concrete Pavement, Small Quantity) and 900.680 Special Provision (Bituminous Concrete Pavement, Type IVB) will be included for adjustment.

If an emulsified asphaltic liquid is used in the Contract work under any Contract item subject to the Asphalt Price Adjustment provisions and that liquid is not included in the table under subpart (5) of PRICE ADJUSTMENT PROCEDURES of the Supplemental Specification, the ACEA as defined in subpart (5) for that liquid will be that as determined by averaging Contractor certified test results for the project.

SECTION 501 - HPC STRUCTURAL CONCRETE

- XX. SUBSECTION 501.02 MATERIALS, is hereby modified by adding the following:

Where a shrinkage reducing admixture will be used in placing concrete as allowed by the Contract Documents, or after contractor request, the following requirements shall be met:

A new concrete mix design shall be submitted indicating the product, dosage and appropriate mix volume adjustments. A shrinkage reducing admixture shall be added during the initial concrete mixing phase or as recommended by the chemical manufacturer product representative. The shrinkage compensating admixture shall be one of the products listed below or a product considered to be equivalent by the Research section. The final dosage rate will be determined by the product representative and the concrete producer. The volume of water contributed to the hydration of the cementitious material will be computed into the final water/cementitious ratio.

Manufacturer: Sika Construction Product Division
Product name: - Sika Control 40
Tel.: 1-800-933-7452
Website: <http://usa.sika.com/dms/getredirect.get/us01.webdms.sika.com/39>

Manufacturer: The Euclid Chemical Company
Product name: Eucon SRA
Tel.: 1-800-321-7628
Website: http://www.euclidchemical.com/fileshare/ProductFiles/techdata/eucon_sra.pdf

Manufacturer: BASF (Master Builders)
Product name: MasterLife SRA 20

Tel.: 1-800-628-9900

Website: <http://assets.master-builders-solutions.basf.com/Shared%20Documents/EB%20Construction%20Chemicals%20-%20US/Admixture%20Systems/Data%20Sheets/MasterLife/BASF-masterlife-sra-20-tds.pdf>

Manufacturer: Grace Construction Products

Product name: Eclipse 4500

Tel.: 1-877-423-6491

Website:

<http://www.buildsite.com/pdf/wrgrace/Eclipse-4500-Product-Data-578947.pdf>

SECTION 652 - EROSION PREVENTION & SEDIMENT CONTROL PLAN

XX. SECTION 652 - EROSION PREVENTION & SEDIMENT CONTROL PLAN, is hereby made a new Section of the Specifications as follows:

XX. 652.01 DESCRIPTION. This work shall consist of designing, furnishing, and submitting for acceptance modifications to the Contract Erosion Prevention & Sediment Control Plan (hereinto known as the EPSC Plan), becoming a co-permittee with the Agency of Transportation, State of Vermont on associated permits, monitoring the EPSC Plan using an On-Site Plan Coordinator, and maintaining the erosion prevention and sediment control measures to ensure the effectiveness of the EPSC Plan.

XX. 652.02 MATERIALS. Materials required for the field work maintenance of the EPSC Plan shall meet all requirements of the appropriate Section of the VAOT Standard Specifications for Construction.

Materials including manuals, checklists, forms, and other supporting documentation necessary to meet the requirements of these provisions and maintain compliance with associated permits shall be made available to the Engineer by the Contractor and maintained on site by the Contractor. Supporting documents associated with the requirements of General Permit 3-9020 are available upon request to ANR or from the ANR Stormwater web page. The VTrans Erosion Prevention and Sediment Control Plan Contractor Checklist and Low Risk Site Inspection Form are available from the VTrans Construction Environmental Engineer.

XX. 652.03 QUALIFICATIONS. Modifications to the EPSC Plan shall be prepared and signed by a Licensed Professional Civil Engineer registered in the State of Vermont or a qualified professional in erosion prevention and sediment control, certified by CPESC, Inc. or equivalent, hereinafter called the "Preparer."

XX. 652.04 EROSION PREVENTION & SEDIMENT CONTROL PLAN. The EPSC Plan, developed using a combination of structural, non-structural, and vegetative practices to adequately prevent erosion and control sedimentation, and meeting the requirements of the VTrans Erosion Prevention & Sediment Control Plan Designer Checklist (Non-Jurisdictional and Low Risk) or the Vermont Standards & Specifications for Erosion Prevention & Sediment Control based on area of disturbance and risk, has been included in the Contract Documents.

The Contractor shall use the EPSC Plan included in the Contract and, at the onset of construction as well as throughout the duration of the project, modify it to describe changing conditions and illustrate how the criteria of the determined risk will be upheld. For Non-Jurisdictional and Low Risk projects, the Contractor shall use the VTrans Erosion Prevention and Sediment Control Plan Contractor Checklist. For Moderate Risk projects, the Contractor shall modify the Contract EPSC Plan in accordance with the General Permit 3-9020 Parts 4 through 6. If a modification to the EPSC Plan at a Low or Moderate Risk project alters any criteria of the determined risk, an updated Risk Evaluation shall be prepared.

The Contractor may use the Agency's EPSC Plan sheet(s) as a basis for necessary modifications; however, if necessary to convey the sequential nature and phases of construction activities and associated erosion prevention and sediment control measures, several plan sheets showing successive site conditions are recommended.

All work shown in the EPSC Plan shall be included in the Contractor's CPM Progress Schedule, as required by Special Provision (CPM Schedule).

- XX. 652.05 SUBMITTALS. Three sets of the modified EPSC Plan as well as the updated Risk Evaluation, stamped and signed by the Preparer, shall be submitted to the Construction Engineer as Construction Drawings in accordance with Section 105. Submittals shall occur after award of the Contract but not later than the Pre-Construction Conference to allow time for review by the Agency. An Acceptance Memo or comments will be provided to the Contractor within 10 working days.

The Contractor shall respond to comments as soon as possible, but not more than 10 days after the date of VTrans initial correspondence. Agency review time for response to comments will be completed within an additional 10 working days. Modifications or additions to the EPSC Plan will not be considered as an acceptable delay of the work under Subsection 108.11.

All subsequent modifications to the EPSC Plan and updates to the Risk Evaluation will be reviewed and forwarded to the ANR by the Agency as appropriate.

Construction activities for EPSC Plan modifications that do not require authorization from the ANR shall commence only after the EPSC Plan has been accepted by the Agency. Construction activities for EPSC Plan modifications that do require authorization from the ANR shall commence only after that authorization has been granted.

- xx. 652.06 MONITORING EROSION PREVENTION & SEDIMENT CONTROL PLAN. The Contractor shall designate a person (On-Site Plan Coordinator) who is directly responsible for the on-site implementation of the EPSC Plan. This person shall generally be on-site on a daily basis during active construction and have the authority to halt construction activities if necessary. The On-Site Plan Coordinator shall have demonstrated experience in construction practices as they relate to erosion prevention and sediment control as well as a general understanding of State and Federal environmental regulations and permits pertaining to the National Pollutant Discharge Elimination System Construction Program. The On-Site Plan Coordinator shall be proficient at reading and interpreting engineering and EPSC plans. Preference will be given to a Licensed Professional Civil Engineer registered in the State of Vermont or a qualified professional in erosion prevention and sediment control, certified by CPESC, Inc. or equivalent. The qualifications of the On-Site Plan Coordinator shall be included in the EPSC Plan. The Engineer, if not satisfied with the performance of this individual, may at any time request a replacement.

During active construction and periods of inactivity, the On-Site Plan Coordinator shall be responsible for inspections and reporting.

- (a) Active Construction. Inspections shall occur once every seven calendar days and within 24 hours of the end of a storm event that results in a discharge of stormwater from the site. During the winter construction season (October 15th to April 15th, inclusive), inspections at all sites shall occur daily.

For Non-Jurisdictional and Low Risk projects, inspections shall be conducted using the Agency's EPSC Plan Inspection Report (Non-Jurisdictional and Low Risk Projects).

For Moderate Risk projects, inspections shall be conducted using the General Permit 3-9020 Inspection Report for Moderate Risk Projects referenced in the Permit and available upon award of the Contract.

Immediate action shall be taken to correct the discharges of sediment, including halting or reducing construction activities as necessary, until the discharge and/or the condition is fully corrected. Corrective actions shall be recorded on the monitoring reports and shown on the EPSC Plan. Each report shall be signed by the On-Site Plan Coordinator.

- (b) Inactive Construction. Periods such as shutdown during the winter season shall require inspection and reporting of erosion prevention and sediment control measures. The Contractor shall contact the Engineer prior to conducting any inspections. The inspections shall be conducted at least once every 30 days and within 24 hours of any storm or significant snow melt event that may cause stormwater runoff to leave the construction site. The Contractor shall provide, within 24 hours, the necessary personnel, equipment, and materials to repair or correct any deficiencies identified during inspection.

All deficiencies and corrective measures taken shall be documented on the reports.

Copies of all reports shall be submitted to the Engineer within 24 hours of inspection or when corrective measures were taken. Copies of all reports shall be kept on site in the Contractor's project files.

- XX. 652.07 MAINTENANCE OF EROSION PREVENTION & SEDIMENT CONTROL PLAN. This work shall consist of providing all labor and equipment necessary for field maintenance of erosion prevention and sediment control items in the Contract, and providing materials and labor necessary for installing, monitoring, maintaining and, where necessary, removing additional measures needed to correct deficiencies that develop during construction that lessen the performance of the EPSC Plan. Erosion prevention and sediment control measures shall be maintained by the Contractor and removed when authorized by the Engineer. The Contractor shall establish vegetation in all areas disturbed during removal of the erosion prevention and sediment control measures.

Any maintenance required due to the failure of the Contractor to follow the EPSC Plan in its accepted form shall be performed at no additional cost to the Agency.

- XX. 652.08 METHOD OF MEASUREMENT. The quantity of EPSC Plan to be measured for payment will be on a lump sum basis in the complete and accepted work.

The quantity of Monitoring EPSC Plan will be measured to the nearest 1/4 hour for the actual number of authorized hours spent monitoring, reviewing, and reporting on the construction site(s), including waste, borrow and staging areas or other support activities, as it relates to the EPSC Plan. Travel time and other time not spent at the construction site(s) or time not authorized will not be measured for payment (i.e. travel expenses, clerical staff time, copying, miscellaneous expenses, overhead, etc.).

The quantity of Maintenance of EPSC Plan will be on a lump unit basis for all such field maintenance provided for in the Contract, excluding waste, borrow and staging areas or other support activities.

- XX. 652.09 BASIS OF PAYMENT. The accepted quantity of EPSC Plan will be paid for at the Contract lump sum price. Payment will be full compensation for the initial preparation of modifications, submittals, and all incidentals necessary to complete the work. Subsequent modifications to the EPSC Plan during Construction will be considered incidental to Contract item 652.10.

Partial payments will be made as follows:

- (a) The first payment of 50 percent of the lump sum price for the EPSC Plan will be paid for upon acceptance of the EPSC Plan for the entire project.
- (b) The second payment of 35 percent of the lump sum price for the EPSC Plan will be made on the first estimate following the completion of 50 percent of the project.
- (c) The third payment of 15 percent of the lump sum price for the EPSC Plan will be made when the project is substantially complete.

The accepted quantity of Monitoring EPSC Plan will be paid for at the Contract unit price per hour. Payment will be full compensation for performing the work specified. Payment will not be made unless a report for the monitoring is submitted to and accepted by the Engineer.

The accepted quantity of Maintenance of EPSC Plan will be paid for as specified for force account work in Subsection 109.06. Payments will be drawn against the Contract Lump Unit amount. To provide a common proposal for all bidders, the Agency has entered an amount in the proposal to become part of the Contractor's total bid. Maintenance related to material supply and disposal areas shall be performed in accordance with Subsection 105.29.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
652.10 EPSC Plan	Lump Sum
652.20 Monitoring EPSC Plan	Hour
652.30 Maintenance of EPSC Plan (N.A.B.I.)	Lump Unit

SECTION 675 - TRAFFIC SIGNS

XX. SUBSECTION 675.02 MATERIALS, is hereby modified by deleting the fifth paragraph in its entirety and replacing it with the following:

All new signs installed shall include a decal on the back of the sign with the following information (in 1 inch numbers and text) and as shown in the example below.

Ownership (Town Name or VTrans)
Date Fabricated (MM/YY)
Route (US XX, VT XX or TH XX)

"Ownership" shall refer to the entity owning the sign. Generally, signs on State Highways and US Routes, as well as stop signs and legal load signs on Town Highways at the intersection with a State or US Route belong to VTrans. All other signs on Class 1, 2 and 3 Town Highways belong to the town.

"Date Fabricated" shall be the month and year of sign fabrication in MM/YY date format.

"Route" shall be the designation of the route the sign is located on. Note that in the case of stop and legal load signs at the intersection of a Town Highway and State Highways, the Owner will be VTrans and the Route will be US XX or VT XX.

SECTION 690 - FUEL PRICE ADJUSTMENT

XX. SECTION 690 - FUEL PRICE ADJUSTMENT, is hereby made a new Section of the Specifications as follows:

XX. In addition to materials produced under Contract pay item(s) included in Table 1 - Pay Item Fuel Usage Factors and Quantity Thresholds as allowed under this Section, fuel usage under:

Contract items 900.608 Special Provision (High Performance Concrete, Class PCD) and 900.608 Special Provision (High Performance Concrete, Class PCS) will be included for adjustment, utilizing the Fuel Usage Factor for item 501.33 Concrete in Table 1.

Contract item 900.680 Special Provision (Bituminous Concrete Pavement, Type IVB) will be included for adjustment, utilizing the Fuel Usage Factor for item 900.680 Special Provision (Bituminous Concrete Pavement, Small Quantity) in Table 1.

XX. 690.01 GENERAL REQUIREMENTS AND CONDITIONS

- (a) This specification contains price adjustment provisions for fuel used on Vermont Agency of Transportation (Agency) construction projects. This price adjustment clause is being inserted in this Contract to provide for either additional compensation to the Contractor or a payment to the Agency, depending upon an increase or decrease in the average price of diesel fuel or gasoline during the construction of this project.
- (b) These provisions apply to this Contract only as specified herein through the fuel usage factors set forth in Table 1. No further fuel price adjustments will be allowed under this Contract.
- (c) It is understood by the Contractor that a price adjustment increase may cause the Agency to decrease the quantities of the Contract pay items subject to adjustment under these provisions. Provisions providing for decreased quantities and item cancellation in this paragraph are separate and take precedence, notwithstanding any other provisions of this Contract.
- (d) No price adjustment will be paid for work performed after the Contract Completion Date, as modified by Change Order, if applicable.
- (e) Price Adjustment, Fuel will be determined for a pay item if each of the following criteria is met:
 - (1) the pay item is included in the original awarded Contract;
 - (2) the original awarded Contract bid quantity for the pay item equals or exceeds the quantity threshold indicated in Table 1.
- (f) Any increase in the total Contract amount due to fuel price adjustment will not be justification for an extension of time under Subsection 108.11.

In such cases that estimated quantities are used to determine estimated fuel price adjustments throughout the duration of the Contract, reconciliation of those estimated adjustments will be made upon the determination of actual final quantities and final adjustments to the total final quantity made by prorating those estimated adjustments over the applicable fuel price adjustment periods previously paid. Reconciliation of any fuel price adjustment will only be performed in those instances where the actual final quantity differs by more than five percent from the total estimated quantity. Payments owed to either the Contractor or VTrans will not be subject to any applicable interest claims.

XX. 690.02 PRICE ADJUSTMENT PROCEDURES

- (a) Prior to advertising for bids, Index Prices for both a gallon of diesel fuel and a gallon of gasoline will be established by the Agency using retail prices reported by the Energy Information Administration (EIA) for the New England Region. The Index Prices will be set monthly using the first EIA posting falling either on or after the 1st calendar day of that month. The Contract Index Prices will be the most recent Index Prices set by the Agency at the time of advertising for bids. These prices are included below and will be the base from which price adjustments are computed.

The index price (retail) for gasoline is \$2.85 per gallon. The index price (retail) for diesel fuel is \$3.27 per gallon. (Found on Contract Admin website - updated monthly: <http://vtrans.vermont.gov/contract-admin/construction>)

- (b) For the duration of the Contract, Posted Prices for both a gallon of diesel fuel and a gallon of gasoline will be established monthly by the Agency. The Posted Prices will be established in the same manner as the Index Prices.
- (c) A Price Adjustment will be paid or credited for diesel fuel and/or gasoline only when the Posted Price of diesel fuel and/or gasoline increases or decreases 5 percent or more over its respective Index Price.
- (d) Payment for Price Adjustment, Fuel will be based upon the quantity of fuel incorporated in the work as determined by the fuel usage factors in Table 1 of this specification for both diesel fuel and gasoline, multiplied by the algebraic difference between the Posted Price and the Index Price for either diesel fuel or gasoline, respectively.
- (e) Payment for Price Adjustment, Fuel shall be computed as follows:

PA = Price Adjustment (LU in \$)
 IPD = Index Price, Diesel Fuel (\$/gallon)
 IPG = Index Price, Gasoline (\$/gallon)
 PPD = Posted Price, Diesel Fuel (\$/gallon)
 PPG = Posted Price, Gasoline (\$/gallon)
 FUFD = Fuel Usage Factor, Diesel Fuel (gallon/unit)
 FUFG = Fuel Usage Factor, Gasoline (gallon/unit)

For $PPD/IPD \leq 0.95$ or ≥ 1.05 and $PPG/IPG > 0.95$ and < 1.05 :
 PA = FUFD X Pay Item Quantity X (PPD - IPD)

For $PPD/IPD > 0.95$ and < 1.05 and $PPG/IPG \leq 0.95$ or ≥ 1.05 :
 PA = FUFG X Pay Item Quantity X (PPG - IPG)

For PPD/IPD and $PPG/IPG \leq 0.95$ or ≥ 1.05 :
 PA = [FUFD X (PPD - IPD) + FUFG X (PPG - IPG)] X Pay Item Quantity

- (f) The Contract bid prices for the applicable pay items will be paid under the Contract. The price adjustment, when such adjustment is required as specified in part (c) of this Subsection, will be made subsequent to the month in which the applicable Contract work was performed and will be entered on the next bi-weekly estimate.
- (g) Payment for Price Adjustment, Fuel shall be debited or credited against the Contract price (lump unit) bid for Price Adjustment, Fuel.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
690.50 Price Adjustment, Fuel (N.A.B.I.)	Lump Unit

TABLE 1 - PAY ITEM FUEL USAGE FACTORS AND QUANTITY THRESHOLDS

Work Category	Pay Item No.	Usage Factor Units	Diesel Fuel (FUF D)	Gasoline (FUF G)	Quantity Threshold
Excavation	203.15	GAL/CY	0.29	0.15	3,000
	203.16	GAL/CY	0.39	0.18	2,500
	204.25	GAL/CY	0.35	0.16	2,500
	208.30	GAL/CY	0.35	0.16	2,000
	208.35	GAL/CY	0.39	0.18	2,000
Borrow	203.30	GAL/CY	0.29	0.15	3,000
	203.31	GAL/CY	0.29	0.15	3,000
	203.32	GAL/CY	0.29	0.15	3,000
Granular Backfill For Structures	204.30	GAL/CY	1	0.16	1,500
Cold Planing, Bituminous Pavement	210.10	GAL/SY	0.12	0	15,000
Subbase	301.25	GAL/CY	0.85	0.56	1,000
	301.35	GAL/CY	0.85	0.56	1,000
Reclaimed Stabilized Base	310.20	GAL/SY	0.04	0	35,000
Pavement	406.25	GAL/TON	3.06	0.86	500
	406.27	GAL/TON	3.06	0.86	500
	490.30	GAL/TON	3.06	0.86	500
Cold Mixed Recycled Bituminous Pavement, Portland Cement	900.675	GAL/SY	0.96	0.75	1
Hand-Placed Bituminous Concrete Material, Drives ¹	900.675	GAL/TON	3.06	0.86	500
Bituminous Concrete Pavement, Small Quantity	900.680	GAL/TON	3.06	0.86	500
Material Transfer Vehicle	900.680	GAL/TON	0.10	0	1
Concrete	501.32	GAL/CY	0.75	0.25	1,000
	501.33	GAL/CY	0.75	0.25	1,000
	501.34	GAL/CY	0.75	0.25	1,000
Stone Fill	613.10	GAL/CY	0.39	0.18	2,000
	613.11	GAL/CY	0.39	0.18	2,000
	613.12	GAL/CY	0.39	0.18	2,000
	613.13	GAL/CY	0.39	0.18	2,000
Guardrail	621.20	GAL/LF	0.18	0.05	5,000
	621.205	GAL/LF	0.18	0.05	5,000
	621.21	GAL/LF	0.18	0.05	5,000
	621.215	GAL/LF	0.18	0.05	5,000

¹ Note that the pay unit is square yards, but the adjustment is based on tons placed.

SECTION 900 - SPECIAL PROVISION ITEMS

PERFORMANCE BASED STRUCTURAL CONCRETE

XX. DESCRIPTION. This work shall consist of designing, furnishing and placing high performance Portland cement concrete for structures and incidental construction.

The Portland cement concrete may consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, water, admixtures, and pozzolans, proportioned and mixed according to these Specifications.

XX. MATERIALS. Materials shall meet the requirements of the following Subsections:

Portland Cement.....	701.02
Portland-Pozzolan Cement.....	701.05
Blended Silica Fume Cement.....	701.06
Portland Blast-Furnace Slag Cement.....	701.07
Fine Aggregate for Concrete.....	704.01
Coarse Aggregate for Concrete.....	704.02
Lightweight Coarse Aggregate for Structural Conc.....	704.14
Preformed Jt. Filler, Cork, and Asphalt-Treated Felt....	707.08
Polyvinyl Chloride (PVC) Waterstop.....	707.10
Bonding Agents.....	707.16
Stay-in-Place Corrugated Metal Forms (SIPCMF).....	715.05
Epoxy Bonding Compound.....	719.02
Concrete Curing Materials.....	725.01
Air-Entraining Admixtures.....	725.02 (b)
Retarding Admixtures.....	725.02 (c)
Water-Reducing Admixtures.....	725.02 (f)
Water-Reducing and Retarding Admixtures.....	725.02 (g)
Water-Reducing, High Range Admixtures.....	725.02 (h)
Water-Reducing, High Range, and Retarding Admixtures....	725.02 (i)
Accelerating Admixtures.....	725.02 (j)
Water-Reducing and Accelerating Admixtures.....	725.02 (k)
Specific Performance Admixtures.....	725.02 (l)
Mineral Admixtures.....	725.03
Mineral Admixtures.....	725.03
Silica Fume.....	725.03 (b)
Ground Granulated Blast-Furnace Slag (GGBFS).....	725.03 (c)
Polystyrene Insulation Board.....	735.01
Blanket Insulation Material.....	735.02
Pipe Insulation.....	740.08
Water.....	745.01

The coarse aggregate for superstructure shall be conditioned so that the total moisture percentage shall be the absorption percentage plus, at a minimum, 0.25% free moisture for the aggregate.

Precast concrete stay-in-place forms (prestressed deck panels) shall conform to the requirements of Section 510.

Any hardened concrete surfaces to have plastic concrete placed against it will be saturated with water, and excess water shall be removed just prior to plastic concrete contacting it.

XX. CLASSIFICATION AND PROPORTIONING. The following classes of concrete are included in these specifications and shall be used as shown on the plans:

TABLE 1 - CLASSIFICATION AND PROPORTIONING

HPC Class ⁵	Air Content (percent)	Slump/Spread Range ⁴ (in.)	Max Slump (in.)	Free Shrinkage (AASHTO T160)	Max W/CM Ratio ²	28 Day Comp. Strength ¹ (psi)	56 Day Surface Resistivity Permeability ³
PCD	7.0 ± 1.5	+/- 1.5	9	0.032%	0.5	4000	Low
PCS	7.0 ± 1.5	+/- 1.5	9	0.042%	0.5	3500	Low
SCC	7.0 ± 1.5	TBD ⁵	--	--	--	4000	Low

¹ The listed 28-day compressive strength is the minimum strength required to meet the design intent.

² The maximum water/cementitious material (W/CM) ratio shall be 0.5, with a maximum water content of 280 lbs/yd³. The acceptable W/CM range of +/- 0.05 added to the target W/CM shall not exceed the specified maximum water content or ratio.

³ The permeability may be tested prior to 56 days but results must still be categorized as Low or Very Low according to AASHTO T358 Table 1.

⁴ The mix shall have a target slump that will allow enough workability to be placed and finished per contract requirements. The slump shall be maintained within the specified range based on the target slump from the approved mix design. The mix shall not exhibit segregation at the slump it is being used at. If the mix does exhibit segregation or exceeds the maximum slump, or outside of the target slump range, the load shall be rejected and subsequent load(s) shall be tested until the mix meets the allowable limits.

⁵ Contractor shall determine minimum and maximum spread range based on trial tests prior to submitting the mix for approval. The Engineer may perform the J Ring test at the time of testing if blocking may be a concern.

PCD = Performance Concrete, Deck
 PCS = Performance Concrete, Substructure
 SCC = Self Consolidating Concrete

If a nominal maximum aggregate size is not specified, the Contractor shall determine the nominal maximum aggregate size, using ACI 211.1 as a guide. In no case will the maximum aggregate size exceed one-fifth of the narrowest dimension between sides of the forms, one-third the depth of slabs, nor three-fourths of the minimum clear spacing between individual reinforcing bars, bundles of bars, or pretensioning strands unless approved by the Engineer.

The Contractor may use industry methods to develop gradations not included in section 704 in order to create better optimized gradations to satisfy the required concrete performance characteristics. If the Contractor is using a combined gradation, they shall provide the method or methods of how they will monitor gradation, the limits of the gradation ranges and frequency of monitoring.

Light weight fine aggregate may be used up to 30% by volume replacement for normal weight sand. The gradation of the light weight fine aggregate shall conform to AASHTO M195. The light weight fine aggregate shall be conditioned for a sufficient amount of time to fully saturate the material. The stockpile shall be constructed so that it contains uniform moisture content throughout the pile. The stockpile will be allowed to drain 12-15 hours immediately prior to use, unless an alternate procedure is approved by the Structural Concrete Engineer. The Contractor shall state the method, duration and procedure used to confirm that the material is at or above saturated surface dry (SSD), by weight, throughout the pile.

The mix may contain a shrinkage-compensating admixture conforming to the requirements of AASHTO M194 or ASTM C494.

Admixtures not on the Approved Products List will be allowed only if tested in the approved mix design. These admixtures will not be allowed for use in other mix designs without proper testing.

The use of chlorides or admixtures containing chlorides is prohibited. All admixtures will be considered incidental to the work and included in the Contract unit price of the concrete.

The concrete materials may be proportioned using the absolute volumes method in accordance with the specified requirements. The volumetric proportioning method such as that outlined in ACI Standard 211.1, *Recommended Practice for Selecting Proportions for Normal Weight Concrete*, or other approved volumetric proportioning methods shall be employed in the mix design.

A minimum of thirty (30) calendar days prior to placement of the trial pour (or prior to the pre-placement meeting, if the trial pour is waived by the Engineer), the Contractor shall submit for approval, the mix design for the class of concrete specified. The mix design(s) shall be submitted to the Agency's Materials Laboratory, attention Structural Concrete Engineer. No class of concrete shall be placed on a project, including the trial pour, until the mix design is approved.

(a) The mix design must contain the following:

- (1) Class of concrete
- (2) Type of mix, conventional or SCC
- (3) Specify if Saturated Surface Dry or Dry Weights
- (4) Name, Source, Specific gravities, and absorptions of aggregates
- (5) Specified 28-day design Compressive Strength
- (6) Cementitious Content and the amount of each in lbs/cubic yard
- (7) Specified air content and range
- (8) Specified surface resistivity value
- (9) Slump target and range for conventional concrete
- (10) Spread minimum and maximum for SCC
- (11) Water/Cementitious Material Ratio target
- (12) Volumetric quantities of each material in the mix design
- (13) Design unit weight of the mix
- (14) Chemical Admixtures (types, brand names, dosages)

Concrete test mix or mixes shall be used to obtain the test results where applicable.

(b) The following test results shall accompany the mix design:

- (1) The concrete test mix slump for conventional concrete, AASHTO T119, shall be +/- 1.5" of the target slump value as stated on the mix design.
- (2) Spread range for SCC will be established for the initial submittal of mix for approval. The J-Ring Test will be conducted per ASTM C1621. The upper and lower ranges of the spread shall not have a difference of greater than 2 inches between the J-Ring and spread test and VSI not greater than 1. Spread test, ASTM C1611, will be done for the production mix only, unless the Engineer requests J-Ring testing to be done.
- (3) The air content, AASHTO T152 shall be within +/- 1.5% of the specified air content value.
- (4) For Conventional mixes the water/cementitious (W/CM) ratio of the concrete test mix) shall be 0.05 above the stated target value on the mix design.
- (5) Cylinder strength, AASTO T22, for 7, 14 and 28-day standard cured cylinders. Deck Concrete mixes shall have 28 day strengths that fall within the upper and lower limits for pay factor adjustments.
- (6) Free shrinkage shall be tested by AASHTO T160 Length Change of Hardened Hydraulic Cement Mortar and Concrete. The cross section of the prism shall be 4 inch. Follow procedure 11.1.2 for storage and measurements. All specified test age results will be submitted. Testing shall be performed by an independent AMRL qualified laboratory accredited in the specific test method.
- (7) The mix shall be tested for scaling in accordance with ASTM C672 Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals. The visual rating shall not be over 2.
- (8) Alkali-Silica Reactivity (ASR) - AASHTO T 303 Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction. If one or more of the aggregates exceeds 0.10% expansion, then test the aggregate again according to ASTM C1567. Testing shall be performed by an independent AMRL qualified laboratory accredited in the specific test method. Each aggregate will be tested separately.
- (9) Surface resistivity testing, AASHTO T 358 Surface Resistivity Indication of Concrete's Ability to Resist Chloride Ion Penetration, shall be done on the test mix. The testing will be done at 28 and 56 days.

All wet testing will have been done by personnel with current ACI Concrete Field Testing Technician Grade I certifications. All other tests shall be performed by a laboratory that is certified in the particular test method or as allowed by the Engineer.

After the mix design furnished by the Contractor has been reviewed and approved by the Structural Concrete Engineer, no new materials shall be incorporated. In no case shall concrete from more than one mix design be permitted to be used during the same pour without prior written approval of the Engineer.

Mix design approvals will be valid for a 12 month period. The approved mix design will be allowed a two consecutive year re-approval if conditions below are satisfied. If no material proportioning or material sources have changed from the previous year's approved mix design. The mix design is submitted with updated aggregate properties and volumes adjusted accordingly. The aggregate properties shall be tested within 60 calendar days of the mix design submission. The properties to be tested include, but are not limited to, specific gravity, unit weight and absorption. The mix design shall be accompanied by the previously completed and accepted test mix data and any applicable updated test information.

The concrete shall have air content by volume as specified. The entrained air shall be obtained by the use of an approved admixture. If an air entraining admixture is proposed that is not currently approved, petrographic analysis per ASTM C457 shall be completed on the test mix to demonstrate the admixture is capable of creating a freeze-thaw durable concrete.

- XX. BATCHING. Measuring and batching of materials shall be done at an approved batch plant. Batch plants shall have an inspection completed prior to the first concrete placement on an Agency project if it has been longer than 12 calendar months from the last inspection. Request for inspection and required documentation must be received by the Material Section a minimum of 21 calendar days prior to the date of the requested inspection. All deficiencies shall be corrected and verified a minimum of 5 calendar days prior to the first concrete placement for any Agency project. The batch plant shall meet the requirements of AASHTO M 157, except as modified in this specification, and shall be maintained in good repair at all times and shall be subject to a periodic inspection by an authorized representative of the Agency. The batch plant shall have an approved method of storing, measuring, and dispensing approved mineral admixtures.

All new or relocated concrete batch plants offered for Agency approval shall be equipped for semi-automatic batching and proportioning of all cementitious material, aggregates, water and for automatic insertion of admixtures. The plants shall be equipped to automatically and accurately record in English units the quantity of all aggregates, cementitious material and the water incorporated into each batch and shall identify and record the addition of the required admixtures.

Proper facilities shall be provided for the Engineer to inspect ingredients and processes used in the batching and delivery of the concrete. The Contractor shall, without charge, afford the Engineer all reasonable facilities for securing samples to determine whether the concrete is being furnished in accordance with these Specifications. The batch room area, the producer shall provide the inspector with a 24" x 18" horizontal working surface at sufficient height to sit at supplied with a seat, with adequate view of the batching controls, display, and power supply.

The Contractor shall give the Engineer 24-hour notice of intent to place concrete so that arrangements can be made for laboratory inspection and control. Failure to give notice which causes postponement of placing operations shall not be reason for determining extension of Contract time per specifications of Subsection 108.11 of the Standard Specifications for Construction.

- (a) Semiautomatic Batch Plants. When actuated by a starting mechanism, the semiautomatic batch controller shall start the weighing operation of the materials and stop the flow automatically when the designated weight has been reached. It shall be interlocked to ensure that the discharge mechanism cannot be opened until the weight is within the tolerance specified in the Production Tolerances for Batching section herein.

Water and admixtures may be batched in a weigh batcher or by volume in a volumetric device. When actuated, volumetric controls shall start the measuring operation and stop the flow automatically when the designated volume has been reached.

- (b) Testing Laboratory. The Contractor shall provide at the plant site a weatherproof building or room for the use of Agency personnel as a testing laboratory. The Contractor shall attain and maintain a qualified laboratory status in accordance with the current edition of the Agency's Qualified Laboratory Program. Failure to comply with this program may result in suspension or revocation of acceptance testing at the facility.

The laboratory shall have a minimum gross internal area of 150 square feet with a layout providing a minimum internal width of 7 feet, in which to house and use the equipment specified. Should the Contractor elect to provide additional equipment relevant to testing of Portland cement concrete and materials, the gross inside floor area of the laboratory shall be increased in proportion to the area required to house and operate the additional equipment. If the additional equipment is to be operated on a bench, the length of bench sections shall also be proportionally increased. An adequate method of ventilation, lighting, heating, and necessary electrical or gas connections shall be provided. Sanitary toilet facilities with lavatory shall be available for use by Agency personnel at the plant site. A dedicated private telephone service shall be provided in the laboratory. A dedicated internet connection, which provides Agency personnel a minimum speed of 700 Kbps (kilobits per second) download, without utilizing compression algorithms, shall be provided in the laboratory. The connection bandwidth speed shall be verifiable using an online speed test.

The laboratory shall be equipped with the following:

- 1 Standard office desk, with lockable drawers or a separate lockable two-drawer file cabinet and chair.
- 1 VTrans' Qualified Laboratory Binder with Producer equipment calibration data
- 1 Bench section(s) at least 2 feet wide providing a minimum of 28 square feet of working area with under counter shelving.
- 1 Standard laboratory stool.
- 1 Fully automatic electronic calculator with eight digit capacity.
- 1 Standard laboratory sink and faucet provided with an adequate supply of water meeting the requirements of Subsection 745.01. The sink shall drain to the outside of the laboratory.
- 1 Bench brush.
- 1 Floor brush.
- 1 Motorized 8 inch sieve shaker (with adjustable timer) with sieving operation conducted by means of lateral and vertical motion of the sieve accompanied by jarring action with the following 8 inch diameter sieves: 3/8 inch, No. 4, No. 8, No. 16, No. 30, No. 50, No. 100, plus pan and cover.

- 1 Mechanical aggregate shaker (with adjustable timer) with a 1 cubic foot capacity with the following screens: 1-3/4 inch, 1-1/2 inch, 1 inch, 3/4 inch, 1/2 inch, 3/8 inch, 1/4 inch, No. 4, No. 8, No. 16, and pan. The aggregate shaker may be placed in a separate enclosed area or be shielded for dust and sound. When the aggregate shaker is placed in a separate enclosed area, there shall be a minimum of 5 feet of clear space measured from the front frame of the shaker outward. The enclosed area shall be well lighted and ventilated. Also, the shaker shall have an adjacent bench section approximately 36 inches high, 24 inches deep and 50 inches long.
- 1 Square pointed shovel
- 5 5 Gallon plastic buckets, with handles
- 1 Electronic balance with a minimum capacity of 50 pounds accurate to 0.0002 pound. If separate fine and coarse aggregate scales are to be used, the fine aggregate scale shall meet AASHTO M 231 4.2 Table 2 Class G2 with a minimum capacity of 1.75 lbs and readable to 0.0002 lbs. The coarse aggregate scale shall meet AASHTO M 231 4.2 Table 2 Class G5 with a minimum capacity of 50 lbs and readable to 0.002 lbs.
- 1 Set of standard masses (weights) to use for verifying electronic balance
- 2 Double burner hot plate, in which both burners are hot, with variable temperature
- 3 Metal pans, nominal size, 9 × 9 × 2 inches.
- 5 Metal pans, nominal size, 9 × 13 × 2 inches.
- 1 Sample splitter, 2-1/2 inch chute.
- 1 10 inch blunted trowel.
- 1 4 feet × 4 feet minimum heavy canvas for quartering samples.
- 1 Brass wire bristle brush.
- 1 Pair, 500° F short contact gloves.
- 2 1-1/2 inch soft bristle paint brushes.

Acceptable substitutes for the aforementioned equipment may be provided when approved by the Structural Concrete Engineer.

Batching operations shall not begin until the testing laboratory has been approved as being in compliance with these Specifications and all equipment and equipment calibration requirements of the current VTrans Quality Assurance Program and Qualified Laboratory Program documents. Removal of any equipment, except with written request and written approval of the Structural Concrete Engineer, will revoke any prior approvals and/or qualifications and require the termination of batching operations.

The building or room designated as a testing laboratory shall be maintained in a clean condition by the producer and kept free of all articles not necessary for the testing of materials. Cleaning supplies shall be furnished by the Contractor.

- (c) Bins and Scales. The batch plant shall include bins, weighing hoppers, and scales with adequate separate compartments for fine aggregate and for each required separate size of coarse aggregate. If cement is used in bulk, a bin, hopper, and scale for cement shall be included. Each compartment shall be designed to discharge efficiently and freely into the weighing hopper or hoppers. Means of control shall be provided so that when required, the material may be added slowly in minute quantities and shut off with precision. Hoppers shall be constructed so as to eliminate accumulations of tare materials and to discharge fully without jarring the scales. Partitions between compartments shall be ample to prevent spilling under any working condition. All batch plant structures shall be properly leveled and maintained in that condition within the tolerance required by the design of the weighing mechanism.

The scales for determining the weight of aggregate, water and cementitious material shall be comprised of a suitable system of levers or load cells. The levers or load cells will determine the weight consistently within 0.5 percent under operating conditions, with loads indicated either by means of a beam with balance indicator, a full-reading dial, or a digital read-out or display.

Adequate means for checking the accuracy of the scales shall be provided by the Contractor either by the use of 50 pound weights or by other methods approved by the Structural Concrete Engineer. Weights shall be certified annually by the Division of Weights and Measures. All exposed fulcrums, clevises, and similar working parts of scales shall be kept clean. When beam-type scales are used, provision shall be made for indicating to the operator that the required load in the weighing hopper is being approached. Poises shall be designed to be locked in any position to prevent unauthorized change of position. All measuring and weighing indicating devices shall be in full view of the operator while charging the hopper and the operator shall have convenient access to all controls.

The scales shall be serviced and their accuracy verified annually by a hopper scale service person licensed by the Division of Weights and Measures of the Vermont Department of Agriculture. For Vermont plants, an inspector representing the Division of Weights and Measures shall witness all testing conducted by the service person and will attach a seal to each hopper scale, provided it meets the current specifications, tolerances, and regulations adopted by the Division of Weights and Measures. Standard test weights used to determine the accuracy of hopper scales shall be certified yearly by the Division of Weights and Measures in accordance with their established standards.

The ready-mixed concrete producer shall hire a licensed hopper scale service person for annual checking and service of scales. In addition, Vermont producers shall schedule an inspection with the Division of Weights and Measures between February 15th and April 30th of each year. After April 30th, Vermont plants without current seals affixed to the hopper scales will not be permitted to supply concrete to Agency projects, unless otherwise directed by the Engineer or until the seals are affixed.

Out of state concrete producers shall observe all annual hopper scale weighing and seal requirements of their respective states of location.

- (d) Production Tolerances for Batching. For weighed ingredients, accuracy of batching is determined by comparison between the desired weight and the actual scale reading; for volumetric measurement of water and admixtures, accuracy is determined by checking the quantity either by weight on a scale or by volume in a calibrated container.

Admixture dispensing systems shall be at a minimum annually calibrated by an admixture distributor representative. A minimum of 2 volumes will be checked. A check will be done at approximately 15% of the minimum and 15% of the maximum manufacturer's recommended dosage range or other targets as approved by the Structural Concrete Engineer.

Batching shall be conducted to accurately measure the desired quantities within the following tolerances:

Cement	± 1 percent
Water	± 1 percent
Aggregates	± 2 percent
Chemical Admixtures	± 3 percent
Mineral Admixtures	+ 10 percent, -1 percent

(e) Storage and Proportioning of Materials.

- (1) Portland Cement. Either sacked or bulk cement may be used. No fraction of a sack of cement shall be used in a batch of concrete unless the cement is weighed.

All bulk cement shall be weighed on an approved weighing device. The bulk cement-weighing hopper shall be properly sealed and vented to preclude dusting during operation. Facilities shall be provided for the sampling of cement at the batch plant, either from the storage silo or from the weighing hopper. This device shall be a permanent installation located so as to allow safe and easy access. It shall provide a sample that represents the true nature of the material being used.

- (2) Water. Water may be measured either by volume or by weight. When measurement is by meter, the water meter shall be so located that the measurements will not be affected by variable pressure and temperature in the water supply line.

Measuring tanks shall be equipped with an outside tap and valve to provide for checking the setting, unless other means are provided for readily and accurately determining the amount of water in the tanks.

All water metering methods shall be verified/calibrated on an annual basis or at any time there is a question of accuracy. All water added to the concrete at any point shall be through an approved metering method.

- (3) Aggregates. Stockpiles shall be formed on hard well-drained areas that prevent contamination from underlying material and accumulation of excessive moisture.

Aggregates from different sources or of different gradations shall not be stockpiled together. Only rubber-tired equipment shall be permitted to operate on aggregate stockpiles.

Stockpiles shall be constructed as follows:

- a. If the stockpile is to be made using mechanical equipment (front end loader, clam bucket, rock ladder, radial stacker, or other approved equipment), the stockpile shall be made in such a manner that segregation is kept to a minimum.

- b. If the stockpile is to be made by dumping from trucks in multiple layers, each layer shall be approximately 4 feet in depth. Each layer shall be completely in place before commencing the next layer. Care shall be taken that successive layers do not "cone" down over the previous layer.
- c. No equipment shall be used to haul aggregate over the stockpiled material except to deposit the material for the layer being placed. It shall be the responsibility of the Contractor that the aggregate be kept free from deleterious material or degradation.

Stockpiles shall be maintained in such a manner that twice the anticipated aggregate requirement for any Agency project placements will be on hand and available for sampling and testing at least 48 hours before mixing operations for the placements are scheduled to begin. The Engineer may modify this requirement when special aggregates are required.

Aggregates shall be handled from stockpiles or other sources to the batch plant in such a manner as to secure a uniform grading of the material. Aggregates that have become segregated, or mixed with earth or foreign material, shall not be used. All aggregates, except lightweight coarse aggregate, produced or handled by hydraulic methods and washed aggregates shall be stockpiled or binned for draining at least 12 hours before being batched. In case the aggregates contain high or non-uniform moisture content, storage or stockpile period in excess of 12 hours may be required by the Engineer.

Stockpiles being watered per specification or allowed through producer QC procedures shall be watered for sufficient time to ensure consistent moisture throughout the stockpile. Aggregate stockpiles being watered shall be loaded in the bin within 1 hour of being batched.

The contractor will do moisture tests within 1.5 hours of anticipated concrete batching time. If there is a visual difference of aggregate moisture appearance, aggregate moisture will be tested again and new moistures will be obtained and used as soon as possible. Material that has been stored in a storage bin for more than 10 hours shall have a moisture done on it. A minimum of one cubic yard of aggregate will be removed from the bottom of the storage bin. A minimum of one cubic yard of aggregate will then be removed and a moisture sample taken. Plants with moisture probes shall have them calibrated/verified a minimum of 24 hours prior to batching or as directed by the Structural Concrete Engineer. Procedure for checking the meter will be to run aggregate over the probe and then collect a portion of the aggregate to perform a moisture test on. If the difference between the meter and the tested moisture content is greater than 0.5%, than the meter will be calibrated.

- d. Lightweight coarse aggregate stockpiles shall be presoaked for a minimum period of time to ensure the aggregate is completely saturated surface dry or greater immediately prior to use as evident by moisture testing. Soaking shall be accomplished by continuous sprinkling or other suitable means that will provide a uniform moisture content throughout the stockpile. Stockpile shall be allowed to drain 12-15 hours immediately prior to use.

- (4) Admixtures. The Contractor shall follow an approved procedure for adding the necessary amount(s) of admixture(s) to each batch. Admixture(s) shall be dispensed in such a manner that will ensure uniform distribution of the material throughout the batch within the required mixing period. Except as specified herein, all admixtures shall be added to the batch at the plant, unless otherwise authorized by the Structural Concrete Engineer.

Chemical admixture containers, metering equipment or scales shall be calibrated annually by a qualified admixture distributor representative. Admixture calibration/ verification shall be done at 15% of the high, approximately the middle and 15% of the low recommended ranges for the admixture being dispensed by the system. The calibration/verification will be done in the presence of an Agency representative when requested by the Agency. All dispensers shall include visual inspection aids such as graduated transparent cylinders. A separate dispenser shall be provided for each liquid admixture. If the dispensing system does not provide visual inspection aids, then periodic verification tests at a frequency satisfactory to the Structural Concrete Engineer, shall be done. Calibration/verification records shall be kept at the production facility for a minimum of one year. The producer shall do the calibration/verification of the metering system(s) when requested. Storage and dispensing systems for liquid admixtures shall be equipped so as to allow thorough circulation and/or agitation of all liquid in the system.

This shall be required prior to the first batching of concrete for Agency projects in any calendar year and periodically thereafter at intervals not to exceed 60 calendar days for the duration of the period the plant is supplying concrete for Agency projects. If the plant has received a delivery of at least 25% of the volume of the storage container, this will be considered as a method of circulation/agitation. If the circulation method is used, the admixture shall be circulated until a complete exchange of admixture is achieved. If an agitation method is used, the method shall be subject to approval by the Structural Concrete Engineer. If an admixture does not need agitation, then the admixture manufacturer shall submit in writing stating this annually.

Storage and dispensing systems for liquid admixtures shall be maintained within the manufacturer's stated temperature and environmental conditions.

It shall be the responsibility of the Contractor to use the quantity of Agency approved admixtures needed to obtain concrete meeting the requirements of the Contract. All admixtures will be approved by the Structural Concrete Engineer prior to incorporation into the mix.

- a. Air-Entraining Admixture. Air-entraining admixture shall be used as required to obtain the specified air content.
 - b. Water-Reducing, Retarding, and Water-Reducing and Retarding Admixtures, accelerators and specialty admixtures. Dosages shall be in the recommended range as stated by the Manufacturer, unless otherwise approved by the Manufacturer.
- (5) Fly Ash or GGBFS. Fly Ash or GGBFS shall be stored at the batch plant in separate storage or holding bins or other approved holding container and shall be protected from rain and moisture.

XX. MIXING AND DELIVERY.

(a) General. Concrete may be mixed at the site of construction, at a central point, or wholly or in part in transit mixers. The production of concrete shall meet the requirements of AASHTO M 157 with the following additional requirements:

- (1) All concrete shall reach its final position in the forms within 1.5 hours after the cement has been added to the water. When the ambient air temperature is 60° F or above, the elapsed time may be reduced as necessary as directed by the Engineer or in accordance with the Hot Weather Concrete section herein.

If in the opinion of the Engineer the concrete visual characteristics appear to be noticeably different from the last acceptance test or previous concrete for that pour, the Engineer may direct the contractor to perform QC tests to confirm the concrete is within conformance to the specifications.

- (2) Authorization by Field Inspection personnel must be obtained prior to the addition of water or admixtures at the Project site. The addition of water in excess of the specified maximum water-cementitious material ratio at time of placement shall not be used.
- (3) Each load of concrete delivered at the job site shall be accompanied by a State of Vermont Batch Slip signed by the authorized Agency representative, if present, at the plant.
- (4) The Contractor shall provide direct communication service from the site of the work to the batch plant that shall be available to the Engineer at all times during concrete operations. The cost of this service will be considered incidental to the work.
- (5) When use of a Water-Reducing, High Range Admixture or Water-Reducing, High Range, and Retarding Admixture is specified for deck concrete, the Contractor shall submit, for the Engineer's approval, the following information: Admixture manufacturer, admixture addition rate, and when the admixture is to be added to the mixture (i.e., at the plant, on project, or a combination thereof). In order to obtain the required concrete characteristics, a representative from the concrete producer is required on the project to determine the final admixture(s) dosage and water addition for each load of concrete. The dosage shall be applied by means of a dispenser, or by other means of accurately measuring volume as approved by the Engineer. The Contractor shall provide QC concrete testing personnel, with current ACI Concrete Field Testing -Technician Grade I certification, to confirm the concrete is within specifications for the required work.
- (6) Not including initial mixing revolutions, all concrete shall be discharged into the forms before 300 revolutions of the drum or blades. The total revolutions may be increased as directed by the Engineer.
- (7) Mortar shall be mixed in an approved mixer at the site of placement or in transit mixers when approved by the Engineer. The Engineer will withdraw approval for use of transit mixers, if necessary, to ensure a quality product or if the rate of delivery cannot be coordinated with finishing requirements.

- (b) Stationary Mixer. When a stationary mixer is used for the complete mixing of the concrete, the mixing time for mixers having a capacity of 10 cubic yards or less shall be not less than 90 seconds. For mixers of more than 10 cubic yards' capacity, the mixing time shall be determined by the concrete producer. The time is valid provided mixer efficiency tests prove the concrete is satisfactory for uniformity and strength. The plant shall be equipped with a timing device that will not permit the batch to be discharged before the predetermined mixing time has elapsed. Vehicles used in hauling shall comply with the requirements of the Transit Mixers section herein.
- (c) Transit Mixers. Transit mixers and agitators shall be subject to a periodic inspection by an authorized representative of the Agency. Such equipment shall bear a currently dated inspection sticker supplied by the Agency indicating that the transit mixer or agitator conforms to the Agency's requirements.

Transit mixers shall be equipped with a water-measuring tank with a visible sight gauge for use when the water for the batch is supplied from the transit mixer tank. The gauge shall be clean and legibly graduated. Measuring tanks shall be provided with outside drain valves or other means to check their calibration. These should be easily opened for checking at any time.

No transit mixer or agitator shall be charged with the ingredients of the concrete unless an authorized Agency representative is present and authorizes it. This requirement may be waived by the Engineer if a batch weight slip accompanies the delivery vehicle to the site.

Electrically actuated revolution counters shall be required on all transit mixers except on mixers charged at central mix plants and utilized as agitator trucks only.

If bagged mineral admixtures are being used, transit mixer maximum load size shall be limited to 80 percent of the manufacturer's rated mixing capacity. Also, legal vehicle load restrictions shall not be exceeded. The mixer shall be capable of combining the ingredients of the concrete into a thoroughly mixed and uniform mass and of discharging the concrete with a satisfactory degree of uniformity.

If bagged mineral admixtures are being used, agitators, when loaded, shall also not exceed 80 percent of the manufacturer's rated mixing capacity or legal load restrictions and shall be capable of maintaining the mixed concrete in a thoroughly mixed and uniform mass and of discharging the concrete with a satisfactory degree of uniformity.

The Engineer may require the Contractor to perform uniformity tests on a transit mixer or agitator. Two samples shall be taken. The first shall be after 15% of the load volume discharge and the second prior to 85% of the load volume discharge. Slump and air content shall be performed on each sample. The maximum difference in air content between the two samples shall be 1%. For slumps of concretes with specified slumps of 4 inches or less, the maximum difference shall be 1 inch. For concretes with a specified slump greater than 4 inches, the maximum difference shall be 1.5 inches. If both conditions are not met, then the Contractor will be required to either modify the mixing procedure and/or batching sequence, or that transit mixer or agitator will not be allowed to deliver concrete to the project. The Contractor will be required to perform uniformity tests to confirm the changes have satisfactory results.

All mechanical details of the mixer or agitator such as water measuring and discharge apparatus, condition of the blades, speed of rotation of the drum, general mechanical condition of the unit and clearance of the drum shall be checked before a further attempt to use the unit will be permitted.

Mixers and agitators shall be kept free from accumulation of hardened concrete or mortar. The mixing blades shall be rebuilt or replaced when any part or section is worn 3/4 inch or more below the original height of the manufacturer's design. A copy of the manufacturer's design, showing the dimensions and arrangements of blades shall be available to the Engineer at the plant at all times.

The mixing of concrete containing silica fume is very important and shall be mixed in accordance with the appropriate situation:

- (1) When silica fume is added to the batch by bags or in bulk from a silo, each batch of concrete shall be mixed for not less than 125 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of the equipment as the mixing speed. The mixing and agitating speeds shall be found on the metal plate on the mixer.
- (2) When silica fume is blended with cement or a combination of cement and mineral admixture at the cement plant prior to being delivered to the concrete plant, each batch of concrete shall be mixed for not less than 70 nor more than 100 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of the equipment as the mixing speed. The mixing and agitating speeds shall be found on the metal plate on the mixer. If inconsistent test results are obtained or the batch of concrete appears not to be completely mixed, the mixing revolutions shall be extended as necessary.

When a transit mixer or agitator is used for transporting concrete, mixing during transport shall be continuous and at two to six rotations per minute or as designated by the manufacturer of the equipment as agitating speed. Failure to do so is cause for rejection of the concrete.

Transit mixers and agitators assigned to a project shall not be used for other purposes until the desired work is completed at the site, and shall arrive at the project within the cycle that anticipated placement conditions dictate. The interval between loads shall be controlled in order that concrete in place shall not become partially hardened prior to placing succeeding batches. The plant capacity and transportation facilities shall be sufficient to ensure continuous delivery at the rate required.

Before discharging transit mix from a transit mixer that has been operating at agitating speed, the drum or blades shall be rotated approximately one minute at mixing speed. The same procedure shall apply to agitators if admixtures, water, or other ingredients are added to the mix in the field.

If additional mixing water is required to maintain the specified slump and is added with the permission of the Engineer, a minimum of 20 revolutions of the transit mixer drum at mixing speed shall be required before discharge of any concrete. At no time shall the total water introduced into any mix exceed the maximum water-cementitious material ratio shown in TABLE 1 - CLASSIFICATION AND PROPORTIONING.

Upon discharge of the concrete from the drum, a sufficient amount of water shall be charged into the drum to properly cleanse the drum. This water shall not be used as a part of the next succeeding batch but shall be discharged from the drum prior to the charging of the drum with the concrete ingredients. The drum shall be completely emptied before receiving materials for the succeeding batch. Retempering of concrete or mortar that has partially hardened, by remixing with or without additional materials, shall not be permitted.

XX. FIELD TESTS. The Contractor shall provide assistance, equipment, materials, and curing for field sampling and testing as required by the Engineer. All costs shall be included in the Contract unit prices under Section 631. The Engineer shall perform all acceptance sampling and testing in accordance with the Agency's Quality Assurance Program. For bridge deck pours, the Contractor shall perform all on-site Quality Control (QC) sampling and testing. The person performing the QC sampling and testing shall have, as a minimum, current ACI Concrete Field Testing Technician Grade I Certification.

- (a) Trial Pour. When concrete will be used for a deck or overlay, or when deemed necessary by the Engineer, the Contractor shall construct a slab to be used for the trial pour. The purpose of the trial pour is to ensure the mix is able to be placed and finished in accordance with these specifications. The slab shall have minimum dimensions of 10 feet by 10 feet by 9 inches thick. If the concrete is intended to be placed by pump, the trial pour concrete shall be placed by pump. The pump will be setup in the configuration that best represents the most difficult pumping condition. The wet concrete properties will be checked at the point of placement. The Contractor will demonstrate that they can provide an acceptable finish to the concrete for the element to be completed. The Contractor will need to bull float a minimum of 50% of the surface area of the slab and hand finish the curb areas in the same manner as anticipated during the production pour. The Contractor may elect to construct the slab so that the same screed equipment and same finishing method can be used as anticipated for the production pour. In this case the Contractor will not be required to bull float a minimum percentage of surface area unless that will be included in their process for finishing the concrete deck surface during the deck pour. The test slab will become the property of the Contractor and removed from the project after completion of the trial pour.

Concrete production activities shall operate so that no deviations are made from the approved mix design. If test results indicate a failure to obtain the characteristics as specified in TABLE 1 - CLASSIFICATION AND PROPORTIONING, the Engineer may reject the material. The Contractor will be responsible for proposing solutions which could include changes to the mix design and will require testing be done with no extra payment. The modified mix design shall not be used until successful test results are obtained during a trial pour that is representative of the anticipated pour conditions. For evaluation, new mix design submittals shall be considered as initial mix design submittals when the cementitious content target changes by more than 5% and/or the aggregate targets are changed by more than 10%. The volumetric proportioning will need to be adjusted on the mix design to achieve the target 27 cubic feet. Any proposed adjustments will be based off the target values of the originally approved mix design

Admixtures which do not affect concrete shrinkage or permeability may be adjusted from the approved mix design as necessary to provide a mix to meet the project requirements. The sources of these admixtures which do not affect concrete shrinkage or permeability can be changed with permission of the Engineer and Structural Concrete Engineer and may not require a new initial mix design submittal. A trial batch may be required as evidence that any change will result in wet test results, and possibly selected hardened concrete properties to confirm they are in compliance with job requirements.

- (b) Sampling. Sampling for tests shall be taken in accordance with AASHTO T 141 or other procedures approved by the Agency. Sampling will be done at point of placement or as close to it as practical.
- (1) Changes. Any time that there is a change in admixture dosage outside of the allowable tolerances, whether modified at the batch plant or at the site, additional QC sampling and testing shall be performed on the modified load prior to incorporating the concrete into the work.
- (2) Beginning of Load Sampling. Beginning of Load Sampling is sampling for QC testing purposes that is taken before 15% of the load has been discharged. Beginning of Load Sampling shall be performed as required by the Engineer, or as needed to ensure that the Concrete meets the contract requirements at the point of placement. The QC personnel shall monitor the placement operation and adjust the mix accordingly to ensure that the material being incorporated into the work meets contract requirements.
- (c) Slump Tests. Slump tests shall be made in accordance with AASHTO T 119.
- (d) Spread Tests. Spread tests for SCC shall be made in accordance with ASTM 1611, Procedure B. Do not tamp the concrete inside the cone.
- (e) VSI Tests. VSI tests for SCC shall be made in accordance with ASTM C 1611 Appendix X.1 and shall be performed on each completed Spread test.
- (f) Air Content Tests. Air content tests shall be made in accordance with the pressure method in AASHTO T 152, for acceptance or rejection.
- (g) Compressive Strength Tests.
- (1) General. The number of compressive strength tests performed should be in accordance with the guidance given in the current edition of the VTrans Materials Sampling Manual. The Engineer may order additional tests as deemed necessary.

Compressive test cylinders shall be made in accordance with AASHTO T 23, and tested for compressive strength in accordance with AASHTO T 22.

For Class SCC, the cylinders shall be filled in one lift using a scoop and dropping the concrete into the center of the mold from a distance of 6 inches from the top edge. The mold shall not be rodded, vibrated, or tapped on the sides.

(2) Categories of Testing.

- a. Acceptance testing utilizes specimens to determine the compliance with requirements for the project. All test cylinders used for quality acceptance testing shall be stored in an approved curing box until they are shipped to the central laboratory.
- b. Job control testing utilizes specimens to determine whether adequate curing procedures are being followed and for early form removal or early loading of structure. All job control specimens shall be stored on the structure and shall receive the same curing and protection from the elements as the concrete that they represent up until 24 hours before anticipated testing of specimens.
- c. Specimen curing requirements shall be as stated in the specifications or as directed by the Engineer. If not specifically stated, the curing shall be as follows:

Number of Specimens	Category	Location of Curing
2	Acceptance	Curing Box
2	Job Control - Applicable Curing Period	On Structure

- (h) Temperature of Concrete. Concrete temperature tests shall be made in accordance with ASTM C 1064.

XX. WEATHER AND TEMPERATURE LIMITATIONS-PROTECTION OF CONCRETE. The temperature of the concrete just prior to placement in the forms shall not be less than 50 °F nor more than 85 °F. Aggregates and water shall be heated or cooled as necessary to produce concrete within these temperature limits.

Placement and curing procedures shall be approved by the Engineer prior to actual placement.

- (a) Hot Weather Concrete. Placement of concrete during hot weather may be limited by the Engineer based on an assessment of temperature, humidity, wind velocity, and sun radiation conditions.

No concrete shall be placed when the ambient air temperature is, or is expected to be, above 90° F.

- (b) Cold Weather Concrete.

- (1) General. Cold weather concrete will be any Concrete placed or cured when the ambient air temperature is expected to be below freezing at any point in time or below 40 °F for an 8 hour continuous period. A cold weather Concrete plan shall be submitted and accepted by the Engineer prior to any Cold Weather Concrete being placed.

The Contractor shall have on the job, ready to install, prior to starting any placing operation, adequate equipment meeting the approval of the Engineer for heating and protecting the materials and freshly placed concrete.

No concrete shall be placed when the temperature of the surrounding atmosphere is lower than 10 °F except by written permission of the Engineer.

No concrete shall be placed in any superstructure or thin section under cold weather conditions.

- (2) Heating of Materials. The heating equipment shall be capable of heating the materials uniformly. Aggregates shall not be heated over 150 °F. If water is heated in excess of 140 °F, the water shall be mixed with the aggregate before the cementitious material is added. The materials shall be heated in such a manner, for such a period of time, and in such quantity as to produce concrete having a uniform temperature within the specified temperature range at the time of placing. Materials containing frost or frozen lumps shall not be used.

Stockpiled aggregates may be heated by the use of dry heat or steam. Aggregates shall not be heated directly by gas or oil flame or on sheet metal over fire. When aggregates are heated in bins, steam-coil or water-coil heating, or other methods that will not be detrimental to the aggregates, may be used.

- (3) Antifreeze Compounds. Salts, chemicals, or other foreign materials shall not be used in the mix to lower the freezing point of the concrete.
- (4) Preparation of Forms. Before placing concrete; ice, snow, and frost shall be completely removed from the forms.

Concrete shall not be placed on a surface or in forms that are frozen, have surface temperatures below 32 °F, or that contain frozen materials. The frozen surface or forms shall be completely thawed the day previous to the placing of the concrete and shall be kept continuously thawed until the concrete is poured. The difference between form or substrate temperature and plastic concrete temperature shall not be more than 40° F.

- (5) Housing. The Contractor shall furnish sufficient canvas and framework or other suitable type of housing to fully enclose and protect the structure. The sidewalls of the housing for protecting shall be completely built before the placing of any concrete. The sidewalls for Decks shall extend below, and fully encapsulate the entire superstructure. They shall be constructed independent of the forms and bracing and with space large enough to provide for form removal and initial finishing of concrete as required during the heating period. Joists adequately spaced to prevent sagging shall support the top of the housing. The housing shall be completely built and the heat applied before placing any concrete.

When the temperature readings taken on or in the concrete indicate the temperature of the concrete may fall below 50° F, the Contractor shall, without exposing the concrete, immediately build the necessary enclosures around the area involved and supply heat to ensure curing conditions as specified in the Curing Concrete section herein. The enclosure shall be removed when directed by the Engineer.

- (6) Heating the Enclosure. The enclosure shall be heated in such a manner that the temperature of the enclosed air shall be kept above 50°F, and not more than 20 °F above the concrete temperature, for the designated curing period. During this time, the concrete shall be kept continuously wet to provide proper curing. After the curing period, the temperature shall be gradually lowered to that of the surrounding atmosphere, taking at least 48 hours for the transition but at no time exceeding a 1 °F change per hour.

When dry heat is used, a means of maintaining atmospheric moisture shall be supplied. The Contractor shall maintain adequate fire protection and shall provide personnel to keep the heating units in continuous operation. When operations are in locations where water levels may fluctuate, the supports for heating equipment shall be built so that the heating equipment can be raised and steam lines shall be placed above the probable high water level.

When using direct fired or indirect fired heaters, the enclosure shall be well ventilated to avoid accumulation of carbon dioxide and carbon monoxide.

When using hydronic heaters, a heat transfer fluid that circulates through a series of hoses, the heat transfer hoses shall be laid on top of the vapor barrier, for example plastic, then covered with approved insulating materials or by other approved method for retaining heat.

- (7) Temperature Records. The Contractor shall provide an automatic temperature recorder to continuously record concrete curing temperatures and ambient air temperatures for the entire curing period. Recording thermometers shall be capable of measuring and recording temperatures within the range of 0° F to 200° F with maximum graduations of 5°F.

Temperature sensors shall be carefully placed within the curing enclosure or the concrete to ensure that temperatures are measured at typical locations. Recorder accuracy shall be certified once every 12 months, and the certificate displayed with each recorder. The Engineer may make random checks of each recorder. On each recorder chart, the Engineer shall indicate the location of the representative concrete, date of placement, and time of start and finish of the record. At the completion of the curing period, the recorder charts shall be given to the Engineer.

A thermometer shall be provided that is capable of displaying the current temperature with a maximum gradation of 1° F. The Inspector will use the thermometer to take periodic temperature measurements of the concrete and enclosure temperatures at varying locations.

When the Contractor places concrete at more than one location within the specified curing period or if the Engineer determines that monitoring of a single pour is necessary in multiple locations, additional monitoring and recording equipment shall be furnished to provide temperature records at each location.

- XX. FORMS. In all cases, the Contractor shall be responsible for, and shall make good, any injury arising from inadequate forms. The Engineer shall inspect and accept all forms prior to concrete placement. Unless the Plans specifically allow for the use of stay-in-place forms, such forms shall not be used in the construction of any superstructure or bridge deck. Stay-in-place forms will only be allowed in the construction of substructure elements in locations where the Engineer agrees that removable formwork is impossible to use.

- (a) Falsework. In general, falsework that cannot be founded upon a solid footing shall be supported by falsework piling.

The Engineer may require the Contractor to employ screw jacks or hardwood wedges to take up any slight settlement in the falsework.

- (b) Construction. Forms shall be mortar tight and sufficiently rigid to prevent distortion due to the pressure of the concrete and other loads incident to the construction operations including vibration. Forms shall be constructed and maintained so as to prevent the opening of joints due to shrinkage of the lumber. Sealer/caulking as approved by the Engineer shall be used where forms abut structural steel members, such as top flanges of beams and girders, etc.

Forms shall be filleted and chamfered at all sharp corners, unless otherwise shown on the Plans or directed by the Engineer, and shall be given a bevel or draft in the case of all projections, such as girders and copings to ensure easy removal.

Falsework and forms for slabs, beams, and girders shall be constructed to provide camber shown on the Plans or ordered by the Engineer.

Falsework and forms for Class SCC shall be designed with consideration given to concrete placement rates, mix temperature, additives, and placement procedures that effect hydrostatic pressure of the concrete. Forms shall be water tight and sufficiently rigid to prevent distortion due to the pressure of the concrete and other loads incident to the construction operations, including vibration, which should not be needed.

- (c) Form Lumber. All face form lumber for exposed surfaces shall be concrete form exterior grade plywood, not less than five ply and not less than 3/4 inch in thickness. In computing stud spacing, plywood shall be considered 1-inch lumber provided that the grain of three of the plies runs perpendicular to the studs.

Form lumber for unexposed surfaces may be dressed tongue and groove, dressed shiplap, or square edge surfaced four sides of uniform width and thickness. It shall have a minimum thickness, after finishing, of 3/4 inch.

All form lumber shall be sound and free from loose or rotten knots, knotholes, checks, splits, or waness showing on the surface in contact with the concrete. Used face form lumber, having defects or patches which may produce work inferior to that resulting from new material, shall not be used.

Other form material may be used with permission of the Engineer.

- (d) Form Ties. Metal ties or anchorages within the forms shall be constructed to permit their removal to a depth of at least 1 inch from the face without injury to the concrete.

Wire ties shall be used only in locations where they will not extend through surfaces exposed in the finished work and then only when authorized.

The cavities shall be filled with cement mortar in accordance with the Concrete Finishing section herein.

- (e) Surface Treatment. All forms shall be treated with commercial form oil prior to placing reinforcement and wood forms shall be saturated with water immediately before placing the concrete. Any material that will adhere to or discolor the concrete shall not be used.

- (f) Metal Forms. The specifications for forms regarding design, mortar tightness, filleted corners, beveled projections, bracing, alignment, removal, reuse, and oiling also apply to metal forms. The metal used for forms shall be of such thickness that the forms will remain true to shape.

All bolt and rivet heads shall be countersunk. Clamps, pins, or other connecting devices shall be designed to hold the forms rigidly together and to allow removal without injury to the concrete. Metal forms that do not present a smooth surface or do not line up properly shall not be used. Care shall be exercised to keep metal forms free from rust, grease, or other foreign matter.

(g) Removal of Forms.

- (1) Deck Superstructure. The forms, or their supports, for any portion of a structure shall not be removed before the end of the 10-day cure period for the deck. Forms under beams or floor slabs may be removed upon approval of the Engineer after the concrete attains 85 percent of the minimum compressive strength as specified in TABLE 1 - CLASSIFICATION AND PROPORTIONING specified herein but not prior to the end of the 10-day cure period.
- (2) Substructure. The forms, or their supports, for any portion of a substructure shall not be removed without the approval of the Engineer. Forms under arches, pier caps or other special designs may be removed upon approval of the Engineer after the concrete attains 85 percent of the minimum compressive strength as specified in TABLE 1 - CLASSIFICATION AND PROPORTIONING specified herein.

The removal of forms and supports may begin when the concrete is found to have the required strength. In no case shall the number of curing days be less than specified in TABLE 2 - CURING OF CONCRETE COMPONENTS.

Methods of form removal likely to cause overstressing of the concrete shall not be used. Forms and their supports shall not be removed without approval. Supports shall be removed in such a manner as to permit the concrete to uniformly and gradually take the stresses due to its own dead load.

(g) Stay-in-Place Corrugated Metal Forms (SIPCMF) for Superstructure Deck Slabs.

- (1) Use. Use of SIPCMF for superstructure deck slab construction shall be subject to the following requirements:
 - a. Fascia overhangs shall be formed with removable forms. The forms used shall leave the resulting concrete flat-surfaced.
 - b. Any bay, constructed in stages such that a longitudinal joint is required, shall be formed with removable forms.
- (2) Design Requirements. The following requirements shall govern the design of SIPCMF:
 - a. Design span shall be the clear span of form plus 2 inches measured parallel to the form flute (also referred to as the form valley).
 - b. Design load shall be the sum of the weight of forms, bar reinforcement, plastic concrete, and 55 psf for construction loads.
 - c. Unit working stress shall not exceed 75% of the specified minimum yield strength of the material.

- d. Dead load deflection shall not exceed $1/180$ times the form span length or $1/2$ inch, whichever is less.
 - e. Physical design properties shall be computed with the requirements of the American Iron and Steel Institute Specifications for the Design of Cold Formed Steel Structural Members, latest edition.
- (3) Construction Requirements. The following construction requirements shall apply to the use of SIPCMF:

- a. Construction Drawings. The Contractor shall submit Construction Drawings for SIPCMF in accordance with Subsection 105.03. These Drawings shall contain the following information as a minimum:
 - 1. A layout showing the compression and tension region of each beam/girder.
 - 2. The method of SIPCMF attachment for the compression and tension regions.
 - 3. Geometric properties of each type of panel being used.
 - 4. Identification of the supplier of the SIPCMF.
 - 5. The number, location, and type of panels being used within each girder bay.
 - 6. Panel laps, taking into account the direction of concrete pours.
 - 7. The specifications for the material used to fill the flutes.
 - 8. Any other material data, erection information, or miscellaneous notes that may be required.
- b. Handling and Installation. Care and protection shall be given the metal form sheets, supports, and accessory items during handling, shipping, and storage. During loading, hoisting, and unloading operations, extra precaution and care shall be taken to prevent damage to ends, corners, and edges of form sheets, supports, and accessory items. If the form units and accessories are to be stored prior to installation, they shall not be placed in contact with the ground and shall be adequately covered or protected to keep them dry.

Form supports shall be placed in direct contact with the flange of beam/girder/stringer or floor beam. All attachments shall be made by permissible welds, bolts, clips, or other approved means. The welding of form supports to steel not considered weldable or to portions of flanges subject to tensile stresses shall not be permitted. Welds and welding shall be in accordance with Subsection 506.10, with the exception that a $1/8$ inch fillet weld will be permitted.

Form sheets shall not be permitted to rest directly on the flanges. They shall be securely fastened to form supports by self-tapping screws and shall have a minimum bearing length of 1 inch at each end. Transverse construction joints shall be located at the bottom of a valley. A 1/4 inch diameter weep hole shall be drilled at the lower end of each flute or valley.

Screed and pouring runway supports shall not be located directly on the form sheets, form supports, or reinforcing steel. No loose sheets or miscellaneous hardware shall be left on the structural slab at the end of the working day.

The corrugated metal sheets shall be fabricated for the placement sequence used, with the joints between sections of sheets overlapped or securely fastened to eliminate differential deflections. Any exposed form metal where galvanizing has been damaged shall be cleaned and repaired to the satisfaction of the Engineer.

- (4) Inspection Procedures. The following three step inspection procedure will be used to check the soundness of the concrete deck against the SIPCMF:
- a. Not less than two days after completion of a concrete structural slab pour, but prior to the next slab pour, one panel of the SIPCMF shall be removed from the most recently completed pour of each span, at a location selected by the Engineer, in order to provide visual evidence that the concrete mix or the construction procedures are obtaining the desired results. If the concrete mix or the construction procedures are varied significantly within a pour, such as a change in the extent of vibration or change in the workability of the mix, another section of forming shall be removed to verify that the new procedures are yielding desirable results.
 - b. After the concrete has attained 85% of the specified design strength, the Engineer will spot-check the underside areas of the steel forms by sounding with a suitable weight hammer. If honeycomb or voided areas are detected, the SIPCMF at that location shall be removed for a visual inspection.
 - c. A minimum of two percent of the total SIPCMF area shall be removed for visual inspection of the concrete surface. The amount of sounding and form removal may be moderated, at the Engineer's discretion, after a substantial amount of the slab has been constructed and inspected, if the Contractor's methods of construction and results of the inspections as outlined above indicate that sound concrete is being obtained throughout the slab.

If, after removing a section of form, the concrete is found to be defective, additional panels shall be removed as directed by the Engineer. All defective concrete shall be repaired to match the adjacent concrete in section and color to the satisfaction of the Engineer.

The Contractor shall provide all facilities required for the safe, suitable, and convenient means of access to the forms for the Engineer's inspection procedures.

The form sections shall be removed by a metal saw or air-carbon-arc gouging with minimum damage to the concrete. Cuts shall only be sufficiently deep to sever the form. Any other method of removal shall be submitted to the Structures Engineer for approval. Cuts parallel to the corrugations in the forms shall be located on the sloping surface midway between a crest and valley. Cuts parallel to the supporting beams/girders shall be made through the supporting angles taking care not to damage the structural steel beams/girders.

The Contractor will not be required to replace the forms which have been removed.

XX. PLACING CONCRETE.

- (a) Workforce. The Contractor shall have sufficient skilled personnel at all times during the concreting operations to properly place, consolidate, and finish the concrete. If, in the opinion of the Engineer, the Contractor does not have sufficient skilled personnel to handle the concrete properly, the Engineer may postpone the start of the concreting operations until such time as the Contractor has remedied this condition.
- (b) Pre-Placement Meeting. For deck pours, or as required by the Engineer, a pre-placement meeting shall be scheduled by the Contractor to take place at least 7 calendar days before concrete placement, and prior to the Trial Pour, if required. Attendees at the pre-placement meeting shall include, but not be limited to, the Contractor's Project Superintendent, the Engineer, the Agency's Structural Concrete Engineer, and the concrete producer. The Contractor shall provide a placement plan that addresses, but is not limited to, the following topics:
- (1) Time of placement and amount
 - (2) Batch plant testing
 - (3) Delivery of concrete
 - (4) Method of concrete placement on the deck
 - (5) Consolidation and finishing of concrete
 - (6) QC testing of the plastic concrete
 - (7) Protection of the concrete from evaporation
 - (8) Curing of the concrete
 - (9) How to avoid long delays for balance loads
 - (10) Screed, workbridge, and rail set-up
 - (11) Dry run schedule
 - (12) Contingency plans for long delays, break downs, weather events and other potential problems
 - (13) Crew size and responsibilities
 - (14) Available equipment

(15) Project layout including locations for pumps, cranes, testing, cleanout, staging, etc.

- (c) Placement Limitations. All concrete shall be placed in daylight, unless otherwise authorized in writing by the Engineer. Authorization to place concrete at any other time shall not be given unless an adequate lighting system is provided prior to beginning the concreting operation.

Concrete shall not be placed under adverse environmental conditions that the Engineer determines will interfere with acceptable placement and/or finishing operations.

Concrete shall not be placed until the depth and character of the foundation, the apparent adequacy of the forms and falsework and the placing of the reinforcing steel have been approved by the Engineer. The interior of the forms shall be clean of all debris before concrete is placed.

The Contractor shall submit to the Engineer a schedule of batching, delivery, and placement prior to the beginning of the concreting operations. The Contractor shall comply with the requirements of the Mixing and Delivery section herein.

Equipment and tools necessary for handling materials and performing all parts of the work shall meet the approval of the Engineer as to design, capacity, and mechanical condition and must be on the site before the work is started. Any equipment that, in the judgment of the Engineer, proves inadequate to obtain results prescribed shall be improved or new equipment substituted or added.

The Engineer may suspend the pour or reject the pour if the Contractor deviates from the accepted pour plan which will also include unacceptable delivery rates. The Contractor will not be allowed compensation due to the pour being suspended or rejected do to the Contractor deviating from the accepted pour plan or uncontrolled delivery rates.

For simple spans, concrete should be deposited by beginning at the lower end of the span and working toward the upper end. For continuous spans, where required by design considerations, the concrete placing sequence shall be as shown on the Plans.

Concrete shall not be deposited in the forms more than 4 feet from its final position.

Dropping of unconfined concrete more than 5 feet will not be permitted.

Concrete shall not be deposited in running water.

The rate of placing the concrete shall be so regulated that no excessive stresses are placed on the forms. Concrete in all decks shall be placed in one continuous operation, unless otherwise specified.

Concrete shall be placed in continuous horizontal layers, the thickness of which shall not exceed 18 inches, unless otherwise directed by the Engineer. Each succeeding layer shall be placed before the underlying layer has taken initial set and shall be consolidated in a manner that will eliminate any line of separation between the layers. When it is necessary, by reason of any emergency, to place less than a complete horizontal layer at one operation, such layer shall terminate in a vertical bulkhead.

After the concrete has taken its initial set, care shall be exercised to avoid jarring the forms or straining the ends of projecting reinforcing bars.

- (d) Placement of Overlays. For a period of at least 12 hours before the placement of overlay material, the prepared surface shall be flooded with water. After removal of all free water, the overlay material shall be deposited on the damp surface and manipulated so as to coat the horizontal and vertical surfaces to be covered. The rate of progress shall be controlled so as to prevent the drying of previously deposited material.
- (e) Use of Chutes. Chutes, troughs, and pipes used in placing concrete shall be arranged so as to avoid segregation of the materials and the displacement of the reinforcement and shall be approved by the Engineer. Aluminum chutes, troughs, or pipes will not be permitted.

All chutes, troughs, and pipes shall be kept clean and free of hardened concrete by thoroughly flushing with water after each run.

Open troughs or chutes shall be either of metal or metal lined and shall extend as nearly as possible to the point of deposit. When the discharge must be intermittent, a hopper or other device for regulating the discharge shall be provided.

Dropping of unconfined concrete more than 5 feet or depositing a large quantity at any point and running or working it along the forms will not be permitted.

- (f) Use of Vibrators. Unless otherwise specified, the concrete shall be consolidated with mechanical vibrators, of an approved type and design, operating within the concrete. When required, vibrating may be supplemented by hand spading with suitable tools to ensure proper and adequate consolidation. Vibrators shall be manipulated to work the concrete thoroughly around the reinforcement and imbedded fixtures and into corners and angles of the forms to produce surfaces free of imperfections. Vibrators shall not be used as a means to cause concrete to flow or run into position instead of placing. The vibration at any point shall be of sufficient duration to accomplish consolidation but shall not be prolonged to the point where segregation occurs.

Vibrators shall have non-metallic or rubber coated heads. Vibrating machines shall at no time be left running unattended in the concrete.

When it is necessary by reason of an emergency to discontinue the placing of a monolithic section, the use of vibrators shall cease. Vibrators shall not again be used until a sufficient depth of fresh concrete is placed to prevent any possibility of the effect of vibration on the concrete already in place and in no case shall this depth be less than 2 feet.

The number of vibrators used shall be ample to consolidate the incoming concrete immediately after it is deposited in the form. The Contractor shall have at least one spare vibrator in serviceable condition at the site of the structure in which more than 25 cubic yards of concrete are to be placed. The vibrators shall be capable of transmitting vibration to the concrete at frequencies of not less than 4500 impulses per minute under load. The vibration shall be of sufficient intensity and duration to cause plasticity, settlement, and complete consolidation of the concrete without causing segregation. The vibrator shall visibly affect a mass of concrete of 2 inch slump over a radius of at least 18 inches.

- (g) Blasting Operation. All blasting operations within 200 feet of any concrete work shall be completed prior to the placement of the concrete. Regardless of the above limitation on blasting operations, the Contractor shall be responsible for any damage resulting from blasting operations.

XX. DEPOSITING CONCRETE UNDERWATER.

- (a) General. Concrete shall not be deposited under water except as specified by the Contract Documents or upon approval of the Engineer and shall be subject to the following specifications:
- (b) Placement. When placing concrete underwater, the Contractor shall use a tremie or an alternate method of conveyance, approved by the Engineer, which minimizes the mixing of fresh concrete and water. A tremie shall have a hopper at the top that empties into a watertight tube at least 10 inches in diameter. The discharge end of the tube on the tremie shall include a device to seal out water while the tube is first filled with concrete. An inflatable ball will not be permitted. The device shall keep its shape and float without danger of deflation.

The placement shall be continuous to the elevations shown on the Plans and the resulting concrete shall be monolithic and homogeneous.

Concrete shall not be deposited in water having a temperature of 35 °F or below. When the water temperature is between 35° F and 40 °F, the mixing water, the aggregates, or both shall be heated as specified in the Cold Weather Concrete section herein.

A tremie shall be constructed of heavy-gauge steel pipe and consist of watertight joints between the tremie sections with a diameter of not less than 10 inches. The tremie hopper shall have a capacity of at least 1/2 cubic yard. When a batch is dumped into the hopper, the flow of the concrete shall be induced by slightly raising the discharge tube, always keeping it in the concrete.

Tubes shall be kept continuously submerged in concrete during discharge. The depth that the tube is submerged in concrete and the height of the concrete in the tube shall be sufficient to prevent water from entering the tube. The Contractor shall continuously monitor the difference in elevation between the top of the concrete and the end of the discharge tube.

Horizontal movement of discharge tubes through the concrete will not be allowed.

For minor quantities, at the sole discretion of the Engineer, a direct pumping method may be approved. If a direct pumping method is to be implemented, the pipe discharging the concrete shall consist of heavy-gauge steel sections. The Contractor shall demonstrate the ability to pump the concrete without the pump line surging or otherwise moving in the water as concrete is being pumped.

Cylinders cured as field cure shall be cured at the same temperature as the water covering the concrete.

- XX. PUMPING. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall be suitable in kind and adequate in capacity for the work. The pump shall be capable of pumping concrete within the specified slump limits. The use of aluminum pipe as a conveyance for the concrete will not be permitted.

The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipeline, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. The equipment shall be arranged so that no resulting vibrations may damage freshly placed concrete.

XX. CONSTRUCTION JOINTS.

- (a) Location of Construction Joints. Joints shall be formed at the location shown on the Plans. Any variation or new location of joints shall require written permission of the Engineer. Feather edges at construction joints will not be permitted. Joints shall be formed with inset form work so that each layer of concrete will have a thickness of not less than 6 inches.
- (b) Joining Fresh Concrete to Previously Set Concrete. In joining fresh concrete to concrete that has hardened, the surface shall be roughened in a manner that will not leave loosened particles or damaged concrete at the surface and be thoroughly cleaned of all laitance, loose, and foreign material. Immediately prior to the placing of the new concrete, the surface shall be saturated with water. When shown on the Plans or ordered by the Engineer, the surface shall be thoroughly coated with a very thin coating of mortar, neat cement grout, or approved bonding agent and all forms drawn tight against the face of the concrete. The neat cement mortar or bonding agent shall not be allowed to dry out before being covered with fresh concrete.
- (c) Filled Construction Joints. Filled construction joints shall contain a preformed cork joint filler or other preformed joint filler that may be shown in the Contract Documents. Joint filler shall be cut to fit exactly and shall completely fill the space that is shown on the Plans. Where a pour grade or caulking grade filler is indicated to be used in the joints, that portion of the joint to be filled shall be formed with a separate material (other than the preformed joint filler) that can easily be removed prior to placement of the above indicated filler.
- (d) Water Stops. Approved water stops shall be placed at locations shown on the Plans. They shall form continuous watertight joints.
- (e) Bond Breakers. Bond breakers shall be one of the following materials as shown on the Plans: asphalt-treated felt, pipe insulation, or tar emulsion.

XX. EXPANSION JOINTS. All joints shall be constructed according to details shown on the Plans.

- (a) Filled Compression and Expansion Joints. Filled compression and expansion joints shall be made with a preformed self-expanding cork joint filler or other preformed joint filler that may be shown in the Contract Documents. Joint filler shall be cut to fit exactly and shall completely fill the space that is shown on the Plans. Where a pour grade or caulking grade filler is indicated to be used in the joint, that portion of the joint to be filled shall be formed with a separate material (other than the expansion joint filler) that can easily be removed prior to placement of the above indicated filler.
- (b) Special Types of Expansion Joints. Special types of expansion joints may be used when shown on the Plans or ordered by the Engineer.

XX. CONCRETE FINISHING.(a) Finishing Bridge Decks and Overlays.

- (1) General. The Contractor shall follow the procedures and details for placing the deck in accordance with the pre-placement meeting. The procedure shall provide for adequate labor, equipment, and material supply to complete placement of concrete on the entire deck, or specified portion thereof. If, during the placement, unforeseen circumstances delay the progression of the pour to a point where the concrete begins to lose plasticity the Contractor shall be prepared to place a bulkhead, as directed by the Engineer.

At any time, the screed machine does not advance in a 15-minute period due to delayed concrete delivery, mechanical breakdown or other problem, the Contractor shall immediately cover concrete that is under the screed machine past the leading edge of the concrete with wet burlap. Just before concrete placement is to begin, the burlap will be removed, the screed machine will be moved back, fresh concrete added to the area that was directly under the screed to the leading edge and this area will be vibrated again. The screed machine may then be advanced forward to continue the placement.

Approval of the method and equipment will not relieve the Contractor of full responsibility for obtaining the required surface finish.

Prior to texturing, the finished concrete surface shall be examined by the Contractor. Surface irregularities greater than 1/8 inch in 10 feet in either the longitudinal or the transverse direction shall be corrected in a manner acceptable to the Engineer. When a bituminous concrete surface is to be placed on a bridge deck, the deviation shall not be greater than 1/4 inch. When a sheet membrane is being applied, sharp ridges shall not be allowed. Thin mortar or laitance, which may have accumulated ahead of the finishing machine screed, shall be removed from the work site. These materials shall not be used to fill depressions.

If the bridge deck concrete does not meet the above smoothness requirements, the Contractor shall remove high spots up to 1/2-inch-high by means of grinding. Any other corrections shall be made only with the written approval of the Engineer. The use of bush hammers will not be allowed. No concrete shall be removed that will result in a concrete slab thickness less than that shown on the Plans.

Any deck that cannot be corrected by a method satisfactory to the Engineer shall be removed and replaced at the Contractor's expense.

Sidewalks shall receive their final finish with a fine bristled broom.

- (2) Bridge Decks With No Asphalt Wearing Surface. After finishing, the surface shall be given a suitable texture with an artificial turf drag made of molded polyethylene or other material or other method that will provide an acceptable finish. The selection of turf drag or other method should be capable of producing a surface texture with a horizontal peak to peak distance ranging from 0.02 inch to 0.25 inch and having a peak to peak amplitude of 0.005 inch to 0.8 inch. Select a turf drag material or other acceptable method that will minimize tearing and rolling of coarse aggregate from the surface.

The Contractor shall apply texture in a transverse direction by hand methods. Other directions may be allowed with the approval of the Engineer. All texturing shall be performed from a work bridge immediately following the finishing operations and prior to curing operations. A second work bridge will be required for curing purposes unless a method using a single work bridge has been approved by the Engineer.

One pass of the turf drag over the finished area is desired. The drag shall leave a seamless strip between passes. Texture resulting from the drag shall stop within 15 inches of the curb face, rail anchor bolts, or edge of deck. Any buildup of concrete at the beginning or end of the pass shall be hand troweled to provide an even transition. An acceptable broom finish may be applied to small areas of deck surface where a turf drag cannot be operated.

The drag should produce a transverse, skid resistant micro-texture acceptable to the Engineer, but should not tear the surface. If the drag is not producing an acceptable micro-texture, the Contractor shall adjust the means and methods until an acceptable micro-texture is achieved.

The Contractor shall check the drag material before the deck pour and from time to time during finishing for tears, worn surface, or hardened concrete. The Contractor should clean or replace the drag as often as necessary to maintain a well-defined micro-texture.

The turf drag or other acceptable method should not be applied when the surface is so wet or plastic that the ridges formed flow back into the valleys when the drag has passed, nor should dragging be delayed until the concrete is so hard that sharp ridges cannot be formed by the drag. Fogging or similar shall be maintained as to not let the surface dry prematurely.

If the 10-minute maximum, as specified in the Curing Concrete - Bridge Decks section specified herein, for applying the wet cure cannot be met, then fogging of the area shall be performed in a manner that keeps the relative humidity above the evaporation rate of the concrete surface, but not so excessive that water begins to collect on the surface prior to texturing or other surface manipulating procedures.

- (3) Finishing Machine Rail Supports. Finishing machine rail supports shall be accurately set and of substantial construction so that the finished deck surface will conform to the profile and transverse sections shown in the Plans. Finishing machine rail supports shall be placed and adjusted to properly provide for the deflection of forms, falsework, and structural supporting members which will occur during the placement of the concrete. The finishing machine rail supports shall be spaced at a maximum of 2 feet on center and of sufficient design as to secure the rail to prevent it from falling off the support. The screed rails shall be configured so as to allow the screed machine and work bridges to be fully functional over the entire deck area.

Sufficient screed rails shall be provided so that all rails necessary for any one continuous pour may be preset and graded before the start of concreting operations. The removal of screed rails and exposed chairs shall be accomplished without walking in the fresh concrete and while the concrete is still plastic.

The Contractor shall furnish a work bridge or bridges of an approved type, capable of spanning the entire width of the deck without deflection to the concrete slab surface.

- (4) Finishing Machines. After the concrete has been placed, it shall be struck off by a finishing machine and the operation repeated as necessary to produce a uniformly consolidated, dense, smooth surface. The final passage of the finishing machine shall result in a uniform surface at the required grade and slope over its entire area.

Machines shall be kept in true adjustment. Machines shall not be used until proper adjustments have been made and the adjustments have been checked and approved by the Engineer.

Sufficient time shall be provided prior to beginning concreting operations for the finishing machine to be operated over the full length of the bridge deck segment to be placed. This test run shall be made with the screed adjusted to its finishing position. While operating the finishing machine in this test, the screed rails shall be checked for deflection and proper adjustment, the cover on slab reinforcement measured, and the controlling dimensions of slab reinforcement and forms checked.

After the concrete is placed, it shall be struck off by one of the following methods:

- a. A self-propelled concrete finishing machine. This machine will be supported on suitable rails and equipped with adjustable strike-off and finishing roller screeds capable of producing the required finish surface for the full width of the bridge from face to face of curbs; or
- b. An approved mechanical vibrating screed exerting a force of not less than 12 pounds per foot, the vibrations of which shall be of not less than 6500 vibrations per minute when checked by a vibration reed-type tester, uniform throughout its entire length and adjusted so as not to drive the aggregate more than 1/4 inch below the surface.

In areas which are inaccessible to finishing machines, use of approved manual vibratory-equipped power screeds with approved grade control method may be used, with approval of the Engineer. Straightness shall be checked as specified in part (a)(1) of this subsection to ensure a smooth ride and seamless transition to the finishing machine's finished area. If manual vibratory-equipped power screeds are used, then initial vibration of the concrete for consolidation in those areas shall be of the minimal duration possible to avoid over vibration and loss of air entraining of the surface concrete in these areas.

Hand finishing shall be allowed only in areas inaccessible to finishing machines or manually driven vibratory-equipped power screeds. Hand screeds or bullfloats shall be magnesium and 10 inches, or more, in width. Care shall be taken not to overwork the concrete surface during any finishing operation. Straightness shall be checked as specified in part (a)(1) of this subsection to ensure a smooth ride and seamless transition to the finishing machine's finished area.

XX. CURING CONCRETE.

- (a) General. Water for use in curing concrete shall conform to the provisions of Subsection 745.01.

Effective cure time shall be only the time that the concrete has been maintained in a wet condition with the concrete surface temperature above 50°F. If the concrete is not maintained in a wet condition and/or the concrete surface temperature drops below 50°F, it shall not be counted as effective cure time. The cure period will be extended 4 hours for every 1 hour the concrete is below 50°F, beginning when the concrete temperature is raised to or exceeds the minimum curing temperature.

Regardless of the curing medium specified, the entire surface of the newly placed concrete shall be kept damp. This shall be achieved by applying water with a nozzle that atomizes the flow so that a mist and not a spray is formed. The moisture shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate in a quantity sufficient to cause a flow or washing of the surface.

The atomized flow shall be applied continuously until the surfaces can be covered by the specified curing mediums. For bridge barriers, curbs, and sidewalks the curing method shall be applied within 15 minutes of the completion of the finishing process.

TABLE 2 - CURING OF CONCRETE COMPONENTS

Type of Construction	Curing Methods	Effective Cure Time (Days)
Substructure	Water Curing Burlap Curing Sand Cover White Burlap-Polyethylene Sheeting White Polyethylene Sheeting with Sand Cover Pre-Dampened Cotton Mats	7
Superstructure	Burlap Curing Pre-Dampened Cotton Mats	10 ¹
Retaining Walls	Water Curing Burlap Curing White Burlap-Polyethylene Sheeting Membrane Forming Curing Compound Pre-Dampened Cotton Mats	7
Headwalls	Water Curing Burlap Curing White Burlap-Polyethylene Sheeting Membrane Forming Curing Compound Pre-Dampened Cotton Mats	7
Sidewalks, Curbs and Gutters	Burlap Curing Pre-Dampened Cotton Mats	7
¹ There shall be no activity on the superstructure during the cure period.		

- (b) Methods of Curing. All exposed surfaces of newly placed concrete shall be cured by one of the following specified methods:

- (1) Water Curing. Curing with water shall be by continuously sprinkling or flooding of all exposed surfaces for the entire required curing period.

- (2) Burlap Curing. The entire exposed surface of the concrete shall be covered with two layers of approved burlap that has been pre-soaked with water. The burlap shall then be covered with a lapped layer of white polyethylene sheeting. Once the concrete superstructure has hardened sufficiently, a stream of water (per soaker hose or other device) shall be continuously applied under the polyethylene sheeting until the cure period is complete.
- (3) Sand Cover. The entire exposed surface of the concrete shall be covered with at least 3 inches of approved sand that shall be kept wet for the entire curing period.
- (4) White Polyethylene Sheeting. The entire exposed surface of the concrete shall be covered with a blanket of white polyethylene sheeting, maintained and fastened to provide a nearly airtight condition in contact with the surface where possible. If, in the opinion of the Engineer, this cover is not adequately provided or maintained to ensure the proper conditions for concrete cure, then white polyethylene sheeting cure shall be terminated and another method substituted.
- (5) White Burlap-Polyethylene Sheeting. The entire exposed surface of the concrete shall be covered with a blanket of white burlap-polyethylene sheeting. The burlap shall be thoroughly dampened prior to placing and shall be placed next to the concrete. All joints shall be lapped a minimum of 18 inches. The burlap shall be kept damp throughout the curing period.
- (6) Membrane Forming Curing Compound. White pigmented or fugitive dye membrane curing solution may be used for curing concrete in minor drainage structures. All other use of curing compound shall be approved in writing by the Engineer. When membrane curing is used, the exposed concrete shall be thoroughly sealed immediately after the free water has left the surface. The concrete inside the forms shall be sealed immediately after the forms are removed and necessary finishing has been done. The solution shall be applied in one or two separate applications. If the solution is applied in two increments, the second application shall follow the first application within 30 minutes. Satisfactory equipment shall be provided, together with means to properly control and ensure the direct application of the curing solution on the concrete surface so as to result in a uniform coverage of the surface area at the rate of 1 gallon for every 150 square feet.

If rain falls on the newly coated concrete before the film has dried sufficiently to resist damage, or if the film is damaged in any other manner, a new coat of the solution shall be applied to the affected portions equal in curing value to that specified above.

Should the surface be subject to continuous injury or the use of curing compound result in a streaked or blotchy appearance, the method shall be stopped and water curing applied.

Only curing compounds approved by the Agency's Materials and Research Section may be used.

- (7) White Polyethylene Sheeting with Sand Cover. This method may be used only when approved by the Engineer and shall conform to the requirements of part (b)(4) above. The airtight condition shall be obtained by the addition of a uniform sand cover at a minimum depth of 2 inches.

- (8) Pre-dampened Cotton Mats. The entire exposed surface of the concrete shall be covered with a blanket of cotton mats that has been pre-dampened with water. The mats shall be maintained in a damp condition until the curing period is complete.
- (c) Bridge Decks. For bridge decks the curing method shall promptly follow the screed machine, within a maximum lag time of 10 minutes and without interruption. If this lag time cannot be met, then fogging of the area shall be performed in a manner that keeps the relative humidity above the evaporation rate of the concrete surface, but not so excessive that water begins to collect on the surface prior to texturing or other surface manipulating procedures.

If, in the opinion of the Engineer, the Contractor's curing procedure is not producing an adequate cure, the Engineer may direct a change in the cure method at no additional cost to the Agency.

XX. LOADING OF CONCRETE. After the concrete has been placed and the finishing operations concluded, it shall not be walked on or disturbed in any manner, including removal of forms, for a minimum period of 18 hours. If retarder is used as an admixture, this minimum period may be extended as directed by the Engineer.

- (a) Substructure. No backfill material shall be placed against a newly completed structure unless the concrete cure is maintained in accordance with TABLE 2 - CURING CONCRETE COMPONENTS, and until the field cured test cylinders have attained 85 percent of the compressive strength specified in TABLE 1. However, the Contractor may erect forms for subsequent concrete placement on footings after 18 hours have elapsed from the time that the footing placement was completed, provided the concrete has sufficient strength to allow it to be worked on without damage, and proper cure is maintained.

Static loads, such as forms, reinforcing steel, or other materials necessary for construction, may be placed on any concrete after it has been in place 72 hours, or a compressive strength of 1800 psi has been obtained, provided proper curing is maintained. Superimposed loads from subsequent concrete pours will not be allowed on any substructure unit or section in place until the field cured test cylinders have attained 85 percent of the compressive strength specified herein by TABLE 1 - CLASSIFICATION AND PROPORTIONING, and provided curing of the supporting section is maintained in accordance with TABLE 2 - CURING CONCRETE COMPONENTS.

- (b) Superstructure. Static loads, such as forms, granite curbing, cast-in-place concrete curb, and other materials necessary for deck construction, may be placed on deck concrete as long as the field cured test cylinders for this concrete have attained 85 percent of the compressive strength specified in TABLE 1 - CLASSIFICATION AND PROPORTIONING or 10 days, whichever is longer. The materials are to be spread out uniformly to avoid point loading.

The Contractor shall keep bridge floors free of all motor vehicles, transit mixers, and heavy construction equipment until the curing period is satisfactorily completed, the field cured test cylinders for the bridge floor concrete have attained the compressive strength specified in TABLE 1 - CLASSIFICATION AND PROPORTIONING, and the field cured test cylinders for the curb concrete have attained 85 percent of the compressive strength specified in TABLE 1 - CLASSIFICATION AND PROPORTIONING.

- (c) Vertical Joint. Concrete shall not be placed against a vertical construction joint until the previously placed concrete has been in place a minimum of 72 hours.

The Contractor must not allow loads that are in excess of the legal loads permitted by the laws of the State to travel over the completed structure, except with written permission of the Engineer.

- 22. METHOD OF MEASUREMENT. The quantity of Special Provision (High Performance Concrete) of the class specified to be measured for payment will be the number of cubic yards used in the complete and accepted work, as determined by the prismatic method using dimensions shown on the Plans or as directed by the Engineer, including the volume of superstructure precast concrete stay-in-place forms, but excluding the volume of steel or other stay-in-place forms and form filling materials. No deductions will be made for the volume of concrete displaced by steel reinforcement, structural steel, expansion joint material, scuppers, weep holes, conduits, tops of piles, scoring, chamfers or corners, inset panels of 1-1/2 inches or less in depth, or any pipe less than 8 inches in diameter.
- 23. BASIS OF PAYMENT. The accepted quantity of Special Provision (High Performance Concrete) of the class specified will be paid for at the Contract unit price per cubic yard. Payment will be full compensation for performing the work specified, including designing the mix, performance of trial pours, satisfactory finishing and curing, and for furnishing all forms, materials, including joint filler and bond breaker, labor, tools, admixtures, equipment, including automatic temperature recording units, trial batches, and incidentals necessary to complete the work.

The cost of heating materials and protecting the concrete against cold weather, and any additional cost for cement, will not be paid for separately but will be considered incidental to the Contract unit prices herein.

The cost of furnishing testing facilities and supplies at the batch plant and the setting of inserts, bench marks, and bridge plaques furnished by the Agency will not be paid for separately but will be considered incidental to the Contract unit price(s) for High Performance Concrete of the class specified.

Costs for all materials, labor and incidentals for steel or other stay-in-place forms and form filling materials will not be paid for separately, but will be considered incidental to the Contract unit price(s) for High Performance Concrete of the class specified.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.608 Special Provision (High Performance Concrete, Class PCD)	Cubic Yard
900.608 Special Provision (High Performance Concrete, Class PCS)	Cubic Yard

CRITICAL PATH METHOD (CPM) SCHEDULE

- XX. DESCRIPTION. This work shall consist of developing and furnishing a CPM Schedule, including narratives, updates, and revisions for the duration of the Contract.

These provisions shall supersede Subsection 108.03(a) of the Standard Specifications.

XX. SUBMISSIONS.

(a) The Contractor is responsible for the scheduling of all Contract work, which shall include, but is not limited to subcontracted work, complete and acceptable submissions, work component fabrications, and delivery of materials. The schedule shall include allowance for time for all aspects of the work including sufficient time for VTrans to perform its functions as indicated in the Contract, including but not limited to acceptance inspection and/or testing, and review and acceptance/approval of any required Working Drawings as defined in Section 105 or otherwise in the Contract Documents.

(b) Provide the following items with each schedule submission. The schedule shall be prepared with MS Project.

- (1) An electronic copy in MS Project format with run date and version of the schedule;
- (2) A PDF illustrated in color, depicting no more than 50 activities on each 11 by 17 in. sheet, and with each sheet including title, project name and number, match data for diagram correlation, and a key;
- (3) A four-week look-ahead narrative to provide a more detailed plan of upcoming work highlighting the near term priorities.

Indicate the anticipated workdays per week, number of shifts per day, number of hours per shift, crew sizes, and assumed resources. If the project requires a road closure, identify any changes in anticipated resources, or work schedule during the closure period.

(c) The CPM schedule shall include the following:

- (1) Activities that describe the essential features of the work, activities that might delay Contract completion, and which activities are on the critical path;
- (2) The planned start and completion dates for each activity and the duration of each activity stated in work days (field activities of more than 15 work days in duration shall be broken into two or more activities distinguished by location or some other logical feature); this estimated figure shall include considerations for permit limitations, seasonal limitations, and any other anticipated delays.
- (3) When the project contains a defined Road or Bridge Closure Period of a minimum of 24 hours and up to a maximum of 28 days, the duration for work within the closure period shall be shown in hours instead of days. The maximum duration of each activity within the closure period shall be limited to twelve (12) hours;
- (4) Finish-to-Start relationships among activities, without leads or lags unless justified in the narrative, and approved by the Engineer;
- (5) Distinct columns showing Predecessors, Successors, Duration, Actual Start, and Actual Finish for each Activity;
- (6) Project suspension or work inactivity that is three (3) days or longer;
- (7) Dates related to the procurement of materials, equipment, and articles of special manufacture;

- (8) Dates related to the submission of Working Drawings, plans, and other data specified for review or approval by the Agency;
 - (9) Key milestone dates specified in the Contract including but not limited to; Notice to Proceed, Interim Completion, Permit Restriction Dates, and Contract Completion Date. These shall be the only constraints in the schedule logic;
 - (10) Activities related to Agency or Third Party reviews and inspections.
- (d) For contracts with an original Contract amount in excess of \$8,000,000.00 the following additional information shall be shown on the CPM schedule:
- (1) Each Contract bid item identified with at least one activity, except:
 - Lump Sum items, Lump Unit items, Contract items paid by the "Hour", Contract items paid by the "Dollar", Section 641 pay items, and Section 653 pay items.
 - (2) Each compensable activity shall identify the applicable Contract item(s), along with the total quantity intended to be placed during that activity.

XX. BASELINE SCHEDULE. The CPM Schedule submittal shall be received by the Engineer a minimum of seven (7) calendar days prior to the preconstruction meeting. The Engineer and Contractor may review the schedule at the preconstruction meeting. Any requested information and a revised schedule shall be submitted within seven (7) calendar days after receiving the Engineer's request. The Engineer shall be allowed twenty-one (21) calendar days to review the schedule and provide a response. The Engineer will review the schedule by assessing the schedule's compliance with these provisions and conformance with the Contract requirements. By accepting the schedule, the Engineer does not modify the Contract in any way. The Baseline Schedule shall be accepted before any field work begins. The accepted schedule will be used as the Baseline Schedule for the remainder of the project.

The schedule shall define and sequence activities so as to accurately describe the project and to meet Contract requirements for scope of work, phasing, accommodations for traffic, and interim, and project completion dates. Create the schedule, beginning with the date of the Notice to Proceed.

XX. SCHEDULE UPDATES. The schedule shall be updated during active construction at the end of every other bi-weekly estimate period (update period) and when directed by the Engineer. Projects with short duration road closures are of particular importance as the project float will be limited. The Contractor shall promptly inform the Engineer of any schedule delays or changes that occur during these periods. The Engineer shall be allowed ten (10) calendar days to review the update for compliance with these provisions and provide a response. Include the following with each update:

- (a) Actual start dates of each activity started;
- (b) Actual finish dates of each activity finished, or remaining durations of activities started but not yet completed;

(c) Narrative report describing progress during the update period, shifts in the critical activities from the previous update, sources of delay, potential problem areas, work planned for the next update period, and changes made to the schedule. Changes include additions, deletions, or revisions to activities due to the issuance of a Contract revision, changes to an activity duration, changes to relationships between activities, or changes to the planned sequence of work or the method and manner of its performance.

(d) The Original schedule shall be shown as a Baseline.

XX. REVISIONS. Schedule revisions shall be submitted within ten (10) calendar days after any of the following:

(a) A written request to revise the schedule from the Engineer;

(b) A delay (actual or projected) to scheduled milestones or project completion dates;

(c) When actual progress falls behind the most recent schedule accepted by the Engineer, either by falling more than two (2) weeks behind schedule or by 5% of the total Contract time, the Contractor shall immediately inform the Engineer in writing. The Engineer may require the Contractor to submit a revised schedule. Neither the Engineer's acceptance of such revised schedule nor any Agency feedback regarding the revised schedule shall be construed as an approval of the revised schedule, nor should it be construed as the Agency's dictation of the Contractor's means and methods;

(d) Issuance of a Change Order/Supplemental Agreement(s) that by adding, deleting, or revising activities, changes the planned sequence of work or the method and manner of its performance;

(e) Issuance of a Change Order/Supplemental Agreement(s) that adds time to the Contract;

(f) The Contractor shall participate in progress meetings at the request of the Engineer to review and discuss the updated schedule information including any activity delay, coordination requirements, change orders, potential delays, and other relevant issues.

The Engineer shall review the revised schedule for compliance with these provisions, and provide a response within ten (10) calendar days.

XX. FLOAT. Any float in the schedule is to be credited to the project only.

XX. FAILURE TO SUBMIT SCHEDULE. Failure to submit a schedule (i.e. original baseline schedule, required updates, revisions, and when requested by the Engineer) in accordance with these provisions may be grounds for suspension of partial payments, as identified in Subsection 109.08, until a satisfactory schedule meeting the requirements of these provisions is received by the Engineer.

XX. METHOD OF MEASUREMENT. The quantity of Special Provision (CPM Schedule) to be measured for payment will be the number of each CPM Schedule (i.e. original baseline schedule, required updates, revisions, and when requested by the Engineer), accepted by the Engineer through the duration of the Contract.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (CPM Schedule) will be paid for at the Contract unit price for each. Payment will be full compensation for preparing and submitting a schedule as specified, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (CPM Schedule)	Each

DECOMMISSION CURB DROP INLET

- XX. DESCRIPTION. This work shall consist of the abandonment of the existing curb drop inlet(s) at the locations shown on the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 604 of the Standard Specifications.

- XX. MATERIALS. Material for flowable fill shall meet the requirements of Section 541.

- XX. CONSTRUCTION REQUIREMENTS. Abandoning existing curb drop inlet(s) includes removing tops and grates, covering the inlets and outlets of culverts entering and exiting the drop inlet, and filling the structure with flowable fill.

Inlets and outlets of culverts in the drop inlet shall be covered in such a manner to prevent flowable fill from entering the culverts.

Flowable fill shall be able to completely fill all existing voids.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Decommission Curb Drop Inlet) to be measured for payment will be the number of curb drop inlets decommissioned in the complete and accepted work.

- XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Decommission Curb Drop Inlet) will be paid for at the Contract unit price for each. Payment will be full compensation for sawcutting the existing shoulder surfaces; performing any required excavation; protecting the remaining portions of the drop inlet and drainage components; furnishing and placing flowable fill; backfilling; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Decommission Curb Drop Inlet)	Each

LIGHT POLE AND LUMINAIRE

- 82. GENERAL. This work shall consist of furnishing and installing ornamental street light poles, fixtures, lights, wiring, and all incidentals, as shown in the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Section 679 of the Standard Specifications.

- 83. MATERIALS. Ornamental poles and luminaires shall be as specified in the Contract Plans. Lighting fixture bulbs shall be light emitting diodes suitable for outdoor street, sidewalk and crosswalk lighting. The light fixture / pole shall include a 120V duplex receptacle with common ground fault interrupter. Poles and housings shall be powder coated gloss black steel.

Prior to ordering the items, the Contractor shall submit Fabrication Drawings in accordance with Section 105. The submittal shall contain at a minimum the information required in Section 679.02, and include the design of the anchor bolts.

Anchor bolts shall meet the requirements of Section 714.08 of the Standard Specifications.

- 84. CONSTRUCTION REQUIREMENTS. All construction and installation shall be in accordance with the plans and Section 679 of the Standard Specifications.
- 85. METHOD OF MEASUREMENT. The quantity of Special Provision (Light Pole and Luminaire) to be measured for payment will be the number of Light Pole and Luminaire assembly installed in the complete and accepted work.
- 86. BASIS OF PAYMENT. The accepted quantity of Special Provision (Light Pole and Luminaire) will be paid for at the Contract unit price per each. This includes, but is not limited to, cover plate and frame, anchor bolts, poles, bases, luminaires, ballasts, wiring, pole identification, necessary fusing, connections to power sources, circuit testing, circuit breakers, photoelectric cells, and grounding. Payment will be full compensation for furnishing, transporting, handling, assembling, and placing the materials specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.620 Special Provision (Light Pole and Luminaire)	Each

BRIDGE RAILING, GALVANIZED METAL RAILING/CONCRETE PARAPET COMBINATION

- 1. DESCRIPTION. This work shall consist of furnishing and erecting cast-in-place concrete parapet bridge railing with galvanized metal railing in accordance with the Plans and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and Sections 501, 513, and 525 of the Standard Specifications.

- 2. MATERIALS. Materials shall meet the following requirements:
 - (a) Concrete. Concrete shall meet the requirements of HIGH PERFORMANCE CONCRETE, CLASS PCD of Section 900.
Coarse aggregate for concrete shall meet the requirements of Subsection 704.02, Table 704.02A.
 - (b) Reinforcing Steel. Reinforcing steel shall meet the requirements of Section 507 for Level II Reinforcing Steel.
 - (c) Metal Railing.
 - (1) Railing Components. Steel for posts, top and bottom rail, and balusters shall be seamless and shall meet the requirements of ASTM A 53/A 53M, Grade B. Steel for base plates and bearing plates shall conform to Subsection 732.03(b).
 - (2) Hardware. Anchor bolts, nuts, and washers shall meet the requirements of Subsection 714.07.

- (3) Finishing. Following fabrication, railing components and associated hardware shall be galvanized in accordance with AASHTO M 232 (ASTM A 53/A 53M) and AASHTO M 111M/M 111 (ASTM A 153/A 153M) and painted black in accordance with Section 513. The color chip shall be No. 27038 in accordance with Subsection 708.03.
3. FABRICATION. Fabrication tolerances for all cast-in-place concrete barrier, regardless of the method of construction, shall conform to the following finished tolerances:
- | | |
|--|---|
| Bar Reinforcement Cover | -0, + $\frac{1}{2}$ inch |
| Width (Top) | -0, + $\frac{1}{4}$ inch |
| Width (Bottom) | -0, + $\frac{1}{2}$ inch |
| Surface Straightness
(Deviation from theoretical centerline) | $\frac{1}{2}$ inch in 20 feet |
| Vertical Alignment
(Deviation from a line parallel to the theoretical grade line) | $\frac{1}{2}$ inch in 20 feet (Deviation) |
- Holes and recesses shall be formed. Percussion drilling is not allowed.
4. CONSTRUCTION REQUIREMENTS. The barrier shape detailed on the Plans shall not be altered. Slip forming of barrier is not allowed.
5. FORMS. Forms shall conform to the railing design shown on the Plans and the forming requirements of Section 501. Forms shall be constructed to allow for checking and correcting the railing alignment and grade after the concrete has been placed and prior to initial set. The forms shall be reinforced in such a manner that finishing of the railing tops will not disturb the final adjusted alignment.
6. CONCRETE FINISHING. Concrete bridge railing shall have a dressed finish. In addition, the following work shall be performed:
- (a) Repairs/Patching. Areas that contain minor defects shall be repaired. Minor defects are defined as holes, honeycombing, or spalls which are 6 inches or less in diameter and do not penetrate deeper than 1 inch into the concrete. Surface voids, or "bugholes", that are less than 1/4 inch in diameter and less than 1/8 inch deep need not be repaired. Repairs shall be made using an overhead and vertical concrete repair material satisfactory to the Engineer. The repair material shall be cured as specified by the manufacturer. Repairs shall be approved by the Engineer.
- (b) Cracking. Cracks less than 0.01 inch in width shall be sealed by a method approved by the Engineer. Cracks in excess of 0.01 inch may be cause for rejection. At the Engineer's discretion, cracks shall be repaired or the bridge railing replaced at the Contractor's expense.
7. CURING CONCRETE. Curing compound shall not be used in curing railing concrete.
- The Contractor and all other project personnel shall take particular care when performing any construction or other operations during the railing curing period in order that the bridge deck is not struck, shaken, or vibrated. After the curing period is completed, all parties shall take care to avoid damaging the railing during the remainder of project construction.
8. METHOD OF MEASUREMENT. The quantity of Special Provision (Bridge Railing, Galvanized Metal Baluster Railing/Concrete Parapet Combination) to be measured for payment will be the number of meters (linear feet) of railing constructed in the complete and accepted work. Measurement will be made along the face of the railing between the pay limits specified.
9. BASIS OF PAYMENT. The accepted quantity of Special Provision (Bridge Railing,

Galvanized Metal Baluster Railing/Concrete Parapet Combination) will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for detailing, furnishing, handling, placing, galvanizing, and painting the materials specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work, including the furnishing of all forms, reinforcing steel, joint filler, admixtures, trial batches, and satisfactory completion of any necessary repairs, surface finishing, and curing.

Water Repellent, Silane used within the pay limits of Special Provision (Bridge Railing, Galvanized Metal Hand Railing/Concrete Parapet Combination) will be paid for separately under Contract item 514.10.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Bridge Railing, Metal Hand Railing/Concrete Parapet Combination)	Linear Foot Galvanized

DUCT BANK

XX. DESCRIPTION. This work shall consist of furnishing and installing underground concrete encased and/or direct burial conduit systems for cable television, electrical power, communication cable, telephone service and fiber optic cable. This work shall also include the furnishing and installing of all conduit, appurtenances, and hardware for transitioning from underground to aerial service. The work shall be performed in conformance with the lines, grades, dimensions, locations, and details shown on the Plans or as determined by the Engineer.

The terms "Duct" and "Conduit" are used interchangeably in these provisions.

XX. MATERIALS. Conduit shall be PVC Schedule 40 Rigid Wall Conduit conforming to NEMA Standard TC-2. Conduit bends (sweeps) shall be galvanized steel with a minimum bend radius of 36 inches.

Concrete shall conform to the requirements of Section 541 for Concrete, Class B.

Sand borrow shall conform to the requirements of Subsection 703.03.

XX. GENERAL REQUIREMENTS. The Contractor shall coordinate and work with each utility company, as necessary, to ensure the conduit systems installed are constructed in accordance with the Plans and the utility company's specifications.

XX. EXCAVATION. The conduit trench shall be excavated to the required depth shown on the Plans and to a width sufficient to install the conduit and concrete encasement. The depth of excavation shall also be sufficient for an initial 3 inch leveling layer of approved backfill material raked smooth so that conduit sections will be either level or on a uniform gradient. The Contractor shall maintain a minimum 12 inch spacing between all parallel duct bank runs unless otherwise noted. For parallel concrete encased duct banks, the Contractor shall provide forms to allow 12 inches of backfill material between the concrete encased duct banks.

All excavation shall be confined to as minimum a surface area as possible, keeping within all applicable safety requirements.

- XX. INSTALLATION OF CONDUIT. Conduit bends shall match bends as noted on the Plans. Conduit at bends (sweeps) shall be galvanized steel with a minimum bend radius of 36 inches. No sharp bends will be allowed except for at poles.

Random "main" conduit may be mandreled at the direction of the Engineer and utility companies' inspector with a 4 inch diameter solid mandrel. The conduit structure shall be mandreled as follows:

- (a) Ten conduits or less: Mandrel two diametrically opposite conduits.

If at the time the cable is being installed in the conduit by the utility, and the cable cannot be pulled through the conduit, then the Contractor shall replace/repair (at the Contractor's expense) the conduit.

Conduit spacers, as approved by the Engineer and utility companies' inspector, must be used to ensure separation between the conduits as shown on the Plans. Spacers are to be placed at 6 foot intervals or as recommended by the product manufacturer.

The Contractor shall furnish and install a minimum 300 pound nylon pull-in cord in each duct. The pull-in cords shall be installed in the completed ducts. Connection of conduit to proposed conduit in the approaches installed by others will be performed by the utility.

The Contractor shall install furnished plastic warning tape, describing buried electrical lines, along the entire length of the duct bank.

Tape shall be installed approximately 6 inches deep or as directed by the utility companies' inspector.

Duct joints shall be made watertight by the use of brush-applied cement as recommended by the manufacturer.

All conduit placement will require approval by the utility companies' inspector prior to concrete placement. Any field modifications will be done only with the approval of the inspectors.

When it is expected that there will be an interval of four hours or longer between pours of concrete, reinforcement bars shall be installed across the construction joint. The bars shall be size #4 and not less than 6 feet in length. One bar shall be installed in each corner, and between ducts in the top and bottom of the concrete envelope, 4 inches from the outside surface. Each reinforcement bar shall extend an equal distance into the two pours of concrete.

Prior to pouring concrete, the duct shall be securely anchored to prevent movement during the pour. Anchors shall be within 2 feet and on each side of a joint, at each end of a bend, and at a maximum distance of 10 feet between anchors.

The Contractor shall confirm, before placing forms or duct lines, that the surface on which concrete is to be poured is firmly compacted fill free from voids, rock, or rubble.

Duct envelope shall be square or rectangular in cross section and shall provide for concrete thickness over the outside ducts as shown on the Plans.

Slump tests shall be performed on all concrete deliveries. The concrete shall be placed carefully so as not to disturb or damage the conduit. The concrete shall be consolidated as directed by the Engineer to eliminate honeycombing or other defects. The Contractor shall ensure that all clearances shown on the Plans are maintained during concrete placement.

The Contractor may place 6 inches of loose approved backfill material on the concrete as soon as the surface is set to aid in curing. However, actual backfilling shall not begin until at least 24 hours after placement of concrete.

XX. BACKFILL. After the concrete has cured for a minimum of 24 hours, and after approval by the Engineer and utilities companies' inspectors, approved material shall be placed over the encased ducts in 6 inch layers and compacted in accordance with Subsection 203.11(d) by using air or mechanical tampers. Hand tampers will not be permitted. The material shall be brought to subgrade beneath roadway, grass belt, and any other paved or gravel areas. For grassed areas outside the highway construction limits, the material shall be brought to within 4 inches of the finished grade, a 4 inch layer of topsoil placed, and the area seeded and mulched in accordance with the applicable requirements of Section 651. Paved, concrete, or gravel areas outside the highway construction limits shall be replaced in kind as directed by the Engineer. Backfill for conduit shall have maximum 1½ inch stone.

XX. METHOD OF MEASUREMENT. The quantities of Special Provision (Concrete Encased Duct Bank) and Special Provision (Direct Burial Duct Bank) of the number and size of ducts specified to be measured for payment will be the number of linear feet installed in the complete and accepted work, measured to the nearest foot along the center of the duct bank.

The pay limit for temporary pavement patching material will be as detailed in the Plans.

XX. BASIS OF PAYMENT. The quantities of Special Provision (Concrete Encased Duct Bank) and Special Provision (Direct Burial Duct Bank) will be paid for at the Contract unit price per linear foot. Payment will be full compensation for furnishing, transporting, handling, and placing the materials specified, including conduit, conduit spacers, transition couplings, elbows and other fittings; caps, plugs, pulling wire, bedding material, concrete encasement, and all other material needed for a complete concrete encased or direct burial duct system; excavation and backfill; placing of concrete; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Any additional depth of excavation required to construct conduit under other utilities, and the cost thereof, shall be considered incidental to Special Provision (Concrete Encased Duct Bank) or Special Provision (Direct Burial Duct Bank), as applicable.

Payment for temporary pavement patch will be made separately under Contract item 900.680 Special Provision (Bituminous Concrete Pavement, Small Quantity).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Concrete Encased Duct Bank, 4 Ducts) (4")	Linear Foot

ORNAMENTAL FENCE

50. DESCRIPTION. This work shall consist of constructing ornamental fence at the location(s) indicated in the Contract Documents and as directed by the Engineer.

The work under this Section shall be performed in accordance with these provisions and the Contract Plans.

51. GENERAL REQUIREMENTS. Ornamental fence shall be: Ameristar Aegis Plus Majestic 3-Rail with Ring.

Panel Height = 5 feet
Panel Width = 8 feet
Paint color = Black

Prior to ordering materials, the Contractor shall submit details for proposed new ornamental fence to the Engineer for approval.

52. METHOD OF MEASUREMENT. The quantity of Special Provision (Ornamental Fence) to be measured for payment will be the number of linear feet installed in the complete and accepted work. Measurement will be along the top of the fence from outside to outside of end posts for each continuous run of fence.

53. BASIS OF PAYMENT. The accepted quantity of Special Provision (Ornamental Fence) will be paid for at the Contract unit price per meter (linear foot). Payment will be full compensation for furnishing, transporting, handling, assembling, placing, galvanizing, and coating the railing components; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Ornamental Fence)	Linear Foot

PRE-EXCAVATION OF ABUTMENT PILES

XX. DESCRIPTION. This work shall consist of removing the foundation materials that may be encountered in designated areas to permit the driving or placing of piles.

XX. MATERIALS. Materials shall meet the requirements of the following Subsections:

Sand.....703.03

XX. CONSTRUCTION REQUIREMENTS. The pre-excavation of abutment piles shall consist of augering, pre-boring, or some other means of excavation to produce an excavation to the depth and diameter specified in the Contract Documents. The excavation shall be maintained to allow for backfilling with sand in accordance with the Contract Documents. Temporary casing is considered an acceptable option.

Following installation of the piles, and in accordance with the plans, the entire pre-excavation shall be filled with sand. Casing used to facilitate installation of the pile and backfill material shall not be left in place.

- XX. METHOD OF MEASUREMENT. The quantities of Special Provision (Pre-excavation of Abutment Piles, Earth), Special Provision (Pre-excavation of Abutment Piles, Rock) and Special Provision (Pre-excavation of Abutment Piles, Unclassified) to be measured for payment will be the total number of linear feet of excavation to the depth specified in the Contract Documents or as ordered by the Engineer, measured to the nearest foot from the bottom of pile cap to the bottom of the excavation limit shown on the plans.
- XX. BASIS OF PAYMENT. The accepted quantities of Special Provision (Pre-excavation of Abutment Piles, Earth), Special Provision (Pre-excavation of Abutment Piles, Rock) and Special Provision (Pre-excavation of Abutment Piles, Unclassified) will be paid for at the Contract unit price linear foot. Payment will be full compensation for furnishing, transporting, storing, and installing the materials specified including the sand, for performing required excavation, and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.640 Special Provision (Pre-excavation of Abutment Piles, Earth)	Linear Foot
900.640 Special Provision (Pre-excavation of Abutment Piles, Rock)	Linear Foot

REMOVE AND RELOCATE EXISTING GRANITE MONUMENT

- XX. DESCRIPTION. This work shall consist of removing and relocating existing granite monument at the location indicated in the Plans and as directed by the Engineer.
- XX. MATERIALS. All materials shall be approved by the Engineer prior to use. Concrete for the foundation shall meet the requirements of item Special Provision (High Performance Concrete, Class PCS).
- XX. GENERAL. This work shall consist of removing and relocating existing granite monument to return the granite monument to the original preconstruction condition and as indicated and specified in the Contract Documents. The work includes, but is not limited to, the following:

Existing granite monument shall be relocated and reset in the new location. The granite monument shall be placed on a new level concrete foundation with dimensions a minimum 3" wider on each face than the existing granite base.

- XX. CONSTRUCTION REQUIREMENTS.

The existing granite monument shall be relocated and reset in the new location. The monument shall be placed on a level foundation and oriented as directed by the Village of Orleans.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Remove and Relocate Existing Granite Monument) to be measured for payment will be on a lump sum basis for each monument removed and relocated in the complete and accepted work.

XX. BASIS OF PAYMENT. The accepted quantity of Special Provision (Remove and Relocate Existing Stone Wall) will be paid for the Contract lump sum price. Payment shall be full compensation for removing and relocating the existing granite monument; furnishing, transporting, handling, and placing the materials specified, including concrete foundation as necessary to complete construction of the monument; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Partial payments will be made as follows:

- (a) An initial payment of 40% of the lump sum price will be paid upon the removal of the existing granite monument.
- (b) The remaining 60% of the lump sum price will be paid when the granite monument has been relocated and reconstructed to the satisfaction of the Engineer.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.645 Special Provision (Remove and Relocate Existing Granite Monument)	Lump Sum

BITUMINOUS CONCRETE PAVEMENT, SMALL QUANTITY

XX. DESCRIPTION. This work shall consist of constructing one or more courses of bituminous mixture on a prepared foundation in accordance with these specifications and the specific requirements of the type of surface being placed, and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and the appropriate provisions of Section 406 or Section 490 of the Standard Specifications.

XX. MATERIALS. Materials shall meet the requirements of the following Subsections:

- Performance-Graded Asphalt Binder.....702.02
- Emulsified Asphalt, RS-1H or CRS-1H.....702.04
- Aggregate for Marshall Bituminous Concrete Pavement.....704.10(a)
- Aggregate for Superpave Bituminous Concrete Pavement.....704.10(b)

Aggregate shall meet requirements relating to Section 406 or 490, where so specified.

The grade of PG asphalt binder used to produce bituminous concrete pavement shall be 70-28. Substitutions will be accepted based on availability where the upper end temperature value is greater than 70°C (158°F) and/or the lower end temperature value is less than -28°C (-18°F).

XX. DESIGN MIX TYPES. Design mix types may be substituted based on mix availability. Allowable mix type substitutions will be accepted on a one to one thickness relationship, except as listed in Tables 1 and 2 below.

TABLE 1 - ALLOWABLE 1-1/2" MIX TYPE IVS SUBSTITUTIONS

Design ESALs (millions)	Design	Allowable Substitution	
	490.30 Superpa ve Bituminou s Concret e Pavemen t	406.25 Bitumino us Concrete Pavement 1	406.27 Med. Duty Bitumino us Concrete Pavement 1
< 0.3	Type IVS	Type III	Type III
0.3 to < 10	Type IVS	Type III	-
1 Per Section 406.			

TABLE 2 - ALLOWABLE 3-1/2" MIX TYPE IIS SUBSTITUTIONS

Design ESALs (millions)	Design	Allowable Substitution	
	490.30 Sup erp ave Bituminou s Concrete Pav eme nt	406.25 Bit umi nou s Concrete Pavement ¹	406.27 Me d. Du ty Bi tu mi no us Concrete Pa ve me nt ¹
< 0.3	Type IIS	Type I	Type I
0.3 to < 10	Type IIS	Type I	-
1 Per Section 406.			

XX. COMPOSITION OF MIXTURE.

- (a) Gradation. Gradation shall meet the requirements of Section 406 or 490, as appropriate.
- (b) Design Criteria. Design Criteria shall meet the requirements of Section 406 or 490, as appropriate.
- (c) Mix Design. Standard mix design will be in accordance with Subsection 490.03 with an n value of 65 gyrations. Allowable substitutions based on pre-existing approved mix designs and/or n values for intended Contract suppliers are listed in Table 3 below. A request for substitutions must be submitted in writing to the Engineer a minimum of 10 working days prior to production. Any substitutions from the standard mix design or mix types as detailed in the Plans shall not result in any increase in cost to the Agency.

TABLE 3 - ALLOWABLE SPECIFICATION SUBSTITUTIONS

Design ESALs (millions)	Acceptable Specification Substitution		
	Superpave Bituminous Concrete Pavement (Gyrations)	Bituminous Concrete Pavement ¹ (75 Blow)	Med. Duty Bituminous Concrete Pavement ¹ (50 Blow)
< 0.3	50	✓	✓
0.3 to < 10	65 ²	✓	-
¹ Per Section 406.			
² Standard mix design specification.			

(d) Quality Acceptance.

- (1) General. Acceptance sampling and testing will be conducted in accordance with the Agency's Quality Assurance Program as approved by FHWA. Bituminous concrete mixtures designated under these specifications will be sampled a minimum of once per day of production or 500 tons (sublot), or other sublot size deemed appropriate, and evaluated by the Agency for each mix type (each mix design) in accordance with the following acceptance guidelines.
- (2) Acceptance Guidelines. Temperature of the bituminous mixture shall be tested using the Verified Thermometer test method and PG Asphalt Binder content determined from the batch slip. Gradation shall be tested in accordance with AASHTO T 30. Mixture volumetric properties (air voids and VMA) shall be calculated in accordance with Subsections 406.03(b) or 490.03(b), as appropriate.
- (3) Non-Compliant Material.
 - a. Rejection by Contractor. The Contractor may, prior to sampling, elect to remove any defective material and replace it with new material at no expense to the Agency. Any such new material will be sampled, tested, and evaluated for acceptance.
 - b. Pay Adjustment. For any non-compliant material outside the production testing tolerances contained in the applicable Table 406.03C or 490.03C, the representative material (sublot) shall be assessed a mixture pay adjustment according to Table 4 Mixture Pay Adjustment.

TABLE 4 - MIXTURE PAY ADJUSTMENT

Criteria	Deductions to be applied to materials outside production testing tolerance.		
	< 1.5X testing tolerance	= 1.5X - 2.0X testing tolerance	> 2.0X testing tolerance
AIR Voids	-5%	-25%	Remove
VMA	-5%	-25%	Remove
Aggregate passing No. 200 sieve	-5%	-25%	Remove
Aggregate larger than No. 200 sieve	-5% applied to each sieve out of tolerance	-10% applied to each sieve out of tolerance	Remove if any sieve out of tolerance
Filler/AC Ratio	See note 2	See note 2	See note 2
<p>1. Deductions will be applied per the table above in conjunction with the testing tolerances as contained in the applicable table 406.03C or 490.03C - PRODUCTION TESTING TOLERANCES.</p> <p>2. A 5% deduction will be applied and coupled with any other applicable deduction in any case that the filler/asphalt ratio is outside the criteria as contained in the applicable table 406.03B or 490.03B - DESIGN CRITERIA.</p> <p>3. The total deduction to be applied to any mix will be the sum total of all applicable deductions as contained in the table above.</p>			

(e) Boxed Samples. If Agency plant inspectors are not available for daily testing and inspection functions, then box samples will be taken by the Engineer at the project site to afford verification of mixture volumetrics/properties. Boxed samples will be processed and results reported to the Engineer within ten working days of being received at the Agency Central Laboratory in Berlin, Vermont.

Gradation shall be tested in accordance with AASHTO T 30. Maximum Specific Gravity shall be tested in accordance with AASHTO T 209. Boxed samples will be assessed a mixture pay adjustment factor of 0.000.

XX. COMPACTION. Special Provision (Bituminous Concrete Pavement, Small Quantity) will be analyzed for density according to the procedure specified below.

The density of the compacted pavement shall be at least 92.0%, but not more than 97.0%, of the corresponding daily average maximum specific gravity for each mix type (each mix design) of bituminous mix placed during each day, or placed per bridge for any bridge project. For material that falls outside of this range, payment will be made by adjusting the daily production totals in accordance with Table 5:

TABLE 5 - DENSITY PAY FACTORS

Average Density	Density Pay Factor, PF(d)
89.0% - 90.4%	- 0.150
90.5% - 91.9%	- 0.100
92.0% - 93.4%	0.000
93.5% - 95.4%	0.150
95.5% - 97.0%	0.000
97.1% - 98.5%	- 0.100

When the Contract allows for a pay adjustment for mat density and the Agency elects to not take cores of any pavement course, the Density Pay Factor (PF(d)) will be considered equal to 0.000.

Bridges with a length equal to, or greater than, 20 feet will be cored for analyzing density of the bridge deck pavement. The minimum number of cores (taken from the center of the travel lane) shall be two, or as directed by the Engineer. Bridges with a length less than 20 feet will not be cored. Bridge decks or approaches will not be cored within 10 feet of a bridge or construction joint.

Bridge deck core areas shall be repaired with hot bituminous mix to the satisfaction of the Engineer at no additional cost to the Agency.

The cores taken for acceptance testing will be the final cores taken for determination of densities.

When the Contract does not allow for a pay adjustment for mat density the Contractor shall, prior to performing any construction operations, submit to the Engineer for approval the proposed rolling pattern and compaction equipment to be used on the project. Random investigative cores will be taken by Agency personnel on the first day's production of any pavement course, with the exception of the leveling course, to verify effectiveness of the proposed rolling pattern and equipment.

Pending results of the investigative cores, necessary adjustments to the proposed rolling pattern and/or equipment shall be made by the Contractor to achieve densities as directed by the Engineer.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) to be measured for payment will be the number of tons for a lot of mixture (each type) complete in place in the accepted work (Q) as determined from the weigh tickets.

The quantities of all applicable Pay Adjustments calculated for the project will be determined as specified below.

When applicable, and when the mixture pay factor, PF(mix), for a lot of Special Provision (Bituminous Concrete Pavement, Small Quantity) is less than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) placed will be multiplied by such pay factor to determine a Mixture Pay Adjustment, (PA(mix)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(mix) = PF(mix) \times Q \times B$$

When applicable, and when the density pay factor, PF(d), for a lot of Special Provision (Bituminous Concrete Pavement, Small Quantity) is less than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) placed that day, or placed per bridge for any bridge project, will be multiplied by such pay factor to determine a Mat Density Pay Adjustment, (PA(d)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(d) = PF(d) \times Q \times B$$

- XX. BASIS OF PAYMENT. The measured quantity of Special Provision (Bituminous Concrete Pavement, Small Quantity) will be paid for at the Contract unit price per ton. Payment shall be full compensation for furnishing, mixing, hauling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment for Pay Adjustments shall be debited against the Contract prices (lump units) bid for the Pay Adjustment items.

The cost of repairing bridge deck core areas will not be paid for separately, but will be considered incidental to Special Provision (Bituminous Concrete Pavement, Small Quantity).

The costs of furnishing testing facilities and supplies at the plant will be considered included in the Contract unit price of Special Provision (Bituminous Concrete Pavement, Small Quantity).

The costs of obtaining, furnishing, transporting, and providing the straightedges required by Subsection 406.16 or Subsection 490.16, as appropriate, will be paid for under the appropriate Section 631 pay item included in the Contract.

The costs associated with obtaining samples for acceptance testing will be incidental to the cost of Special Provision (Bituminous Concrete Pavement, Small Quantity).

When not specified as items in the Contract, the costs of cleaning and filling joints and cracks, sweeping and cleaning existing paved surfaces, the emulsified asphalt applied to tack these surfaces, and tacking of manholes, curbing, gutters, and other contact surfaces will not be paid for directly, but will be incidental to Special Provision (Bituminous Concrete Pavement, Small Quantity).

Special Provision (Bituminous Concrete Pavement, Small Quantity) mixture approved by the Engineer for use in correcting deficiencies in the base course constructed as part of the Contract will not be paid for as Special Provision (Bituminous Concrete Pavement, Small Quantity), but will be incidental to the Contract item for the specified type of base course.

Special Provision (Bituminous Concrete Pavement, Small Quantity) mixture used to correct deficiencies in an existing pavement or to adjust the grade of a bituminous concrete surface completed under the Contract will be paid for at the Contract unit price for Special Provision (Bituminous Concrete Pavement, Small Quantity).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.650 Special Provision (Mat Density Pay Adjustment, Small Quantity) (N.A.B.I.)	Lump Unit
900.650 Special Provision (Mixture Pay Adjustment) (N.A.B.I.)	Lump Unit
900.680 Special Provision (Bituminous Concrete Pavement, Small Quantity)	Ton

BITUMINOUS CONCRETE PAVEMENT, TYPE IVB

XX. DESCRIPTION. This work shall consist of constructing one or more courses of bituminous mixture on a prepared foundation in accordance with these specifications and the specific requirements of the type of surface being placed, and in reasonably close conformity with the lines, grades, thicknesses, and typical cross sections shown on the Plans or established by the Engineer.

The work under this Section shall be performed in accordance with these provisions, the Plans, and the appropriate provisions of Section 490 of the Standard Specifications.

XX. MATERIALS. Materials shall meet the requirements of the following Subsections:

- Performance-Graded Asphalt Binder.....702.02
- Emulsified Asphalt, RS-1H or CRS-1H.....702.04
- Aggregate for Marshall Bituminous Concrete Pavement.....704.10(a)
- Aggregate for Superpave Bituminous Concrete Pavement.....704.10(b)

Aggregate shall meet requirements relating to Section 406 or 490, where so specified.

The grade of PG asphalt binder used to produce bituminous concrete pavement shall be 70-28. Substitutions will be accepted based on availability where the upper end temperature value is greater than 70°C (158°F) and/or the lower end temperature value is less than -28°C (-18°F).

XX. COMPOSITION OF MIXTURE.

(a) Design Criteria. Design criteria shall meet the requirements of Subsection 490.03 of the Standard Specifications and additional requirements as specified herein.

- (1) Type IVB Material shall have an air void target of 3.0% (with a 1.0% production tolerance).
- (2) Type IVB bituminous material shall be designed and produced with a 0.0% RAP content.
- (3) Type IVB material shall meet the gradation requirements of Superpave Bituminous Concrete Pavement Type IVS as contained in Table 490.03A of Section 490.

XX. COMPACTION. Compaction shall meet the requirements of Subsection 490.14 of the Standard Specifications as modified herein.

The density of the compacted pavement shall be at least 92.0%, but not more than 97.0%, of the corresponding average maximum specific gravity for each mix type (each mix design) of bituminous mix placed upon any individual bridge deck and a pay factor adjustment applied as per the table below. For material that falls outside of this range, payment will be made by adjusting the production totals in accordance with the table below.

TABLE 1 - DENSITY PAY FACTORS (BRIDGE MIX)

Average Density, Percent	Density Pay Factor, PF(d)
89.0 - 90.4	- 0.250
90.5 - 91.9	- 0.150
92.0 - 93.4	0.000
93.5 - 95.4	0.150
95.5 - 97.0	0.000
97.1 - 98.5	-0.150

For material with an average density that is less than 89.0% or in excess of 98.5%, the material will be removed and replaced by the Contractor at no expense to the Agency.

It shall be the responsibility of the Contractor to conduct proper process control the Contractor deems necessary. Acceptance testing will be conducted by Agency personnel using cores extracted and provided by the Contractor. The cores taken for acceptance testing will be the final cores taken for determination of density.

When the Contract provides for a mat density pay adjustment and the Agency elects not to take cores of any pavement course, the Density Pay Factor (PF(d)) will be considered to be equal to 0.000.

Bridge decks with a length equal to or greater than 20 feet will be cored for the purpose of analyzing density of the bridge deck pavement per this Subsection. The minimum number of cores samples, or "sublots", to be analyzed per bridge deck shall not be less than 4. Core sublots will be restricted to travel and passing lanes only and will be taken at the rate of 2 sublots per bridge deck lane for those bridges less than or equal to 400 feet in length. For those bridges greater than 400 but less than or equal to 650 feet in length, core samples will be taken at the rate of 3 sublots per bridge deck lane. For those bridges greater than 650 feet in length, core samples will be taken at the rate of 4 sublots per bridge deck lane. Core samples will not be taken within 6 inches of a longitudinal construction joint nor within 15 feet of a mechanical bridge joint. Random and independent mat and/or shoulder core sampling locations may be selected by the Engineer to afford verification of this Subsection.

Additionally, for those Contracts having single, or multiple, bridge decks within the project limits, each individual bridge deck shall be considered a "lot" for the purpose of analyzing for density with any associated density pay factor adjustment applied to that lot. Bridge decks of a length less than 20 feet will not be analyzed for density.

All compaction equipment used to achieve bridge deck compaction shall be "static" in nature. Vibratory equipment may be used provided that equipment is operated in "static" mode. All requirements of this provision and Subsection 490.14 shall apply regardless of the type of compaction equipment used.

When the Contract does not provide for a mat density pay adjustment, the Contractor shall, prior to performing any construction operations, submit to the Engineer for approval the proposed rolling pattern and compaction equipment intended to be used on the project. Random investigative cores shall be taken by Contractor personnel and submitted to the Engineer for the purpose of verifying the effectiveness of the compaction equipment and rolling pattern used. Pending results of any investigative cores, the Contractor shall make any necessary adjustments to achieve acceptable densities as defined herein.

- XX. METHOD OF MEASUREMENT. The quantity of Special Provision (Bituminous Concrete Pavement, Type IVB) to be measured for payment will be the number of tons for a lot of mixture (each type) complete in place in the accepted work (Q) as determined from the weigh tickets.

The quantities of all applicable Pay Adjustments calculated for the project will be determined as specified below.

When applicable, and when the density pay factor, PF(d), for a lot of Special Provision (Bituminous Concrete Pavement, Type IVB) is less than or greater than 0.000, the measured quantity of Special Provision (Bituminous Concrete Pavement, Type IVB) placed that day, or placed per bridge for any bridge project, will be multiplied by such pay factor to determine a Mat Density Pay Adjustment, (PA(d)), to the accepted tonnage placed (Q) for that lot based on the Contract bid price (B), as follows:

$$PA(d) = PF(d) \times Q \times B$$

- XX. BASIS OF PAYMENT. The measured quantity of Special Provision (Bituminous Concrete Pavement, Type IVB) will be paid for at the Contract unit price per ton. Payment shall be full compensation for furnishing, mixing, hauling, and placing the material specified and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

Payment for Pay Adjustments shall be debited against the Contract prices (lump units) bid for the Pay Adjustment items.

The cost of repairing bridge deck core areas will not be paid for separately, but will be considered incidental to Special Provision (Bituminous Concrete Pavement, Type IVB).

The costs of furnishing testing facilities and supplies at the plant will be considered included in the Contract unit price of Special Provision (Bituminous Concrete Pavement, Type IVB).

The costs of obtaining, furnishing, transporting, and providing the straightedges required by Subsection 406.16 or Subsection 490.16, as appropriate, will be paid for under the appropriate Section 631 pay item included in the Contract.

The costs associated with obtaining samples for acceptance testing will be incidental to the cost of Special Provision (Bituminous Concrete Pavement, Type IVB).

When not specified as items in the Contract, the costs of cleaning and filling joints and cracks, sweeping and cleaning existing paved surfaces, the emulsified asphalt applied to tack these surfaces, and tacking of manholes, curbing, gutters, and other contact surfaces will not be paid for directly, but will be incidental to Special Provision (Bituminous Concrete Pavement, Type IVB).

Special Provision (Bituminous Concrete Pavement, Type IVB) mixture approved by the Engineer for use in correcting deficiencies in the base course constructed as part of the Contract will not be paid for as Special Provision (Bituminous Concrete Pavement, Type IVB), but will be incidental to the Contract item for the specified type of base course.

Special Provision (Bituminous Concrete Pavement, Type IVB) mixture used to correct deficiencies in an existing pavement or to adjust the grade of a bituminous concrete surface completed under the Contract will be paid for at the Contract unit price for Special Provision (Bituminous Concrete Pavement, Type IVB).

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
900.650 Special Provision (Mat Density Pay Adjustment, Type IVB) (N.A.B.I.)	Lump Unit
900.680 Special Provision (Bituminous Concrete Pavement, Type IVB)	Ton